DOCUMENT RESUME

ED 067 304 SE 014 917

AUTHOR Bemiss, Clair W.

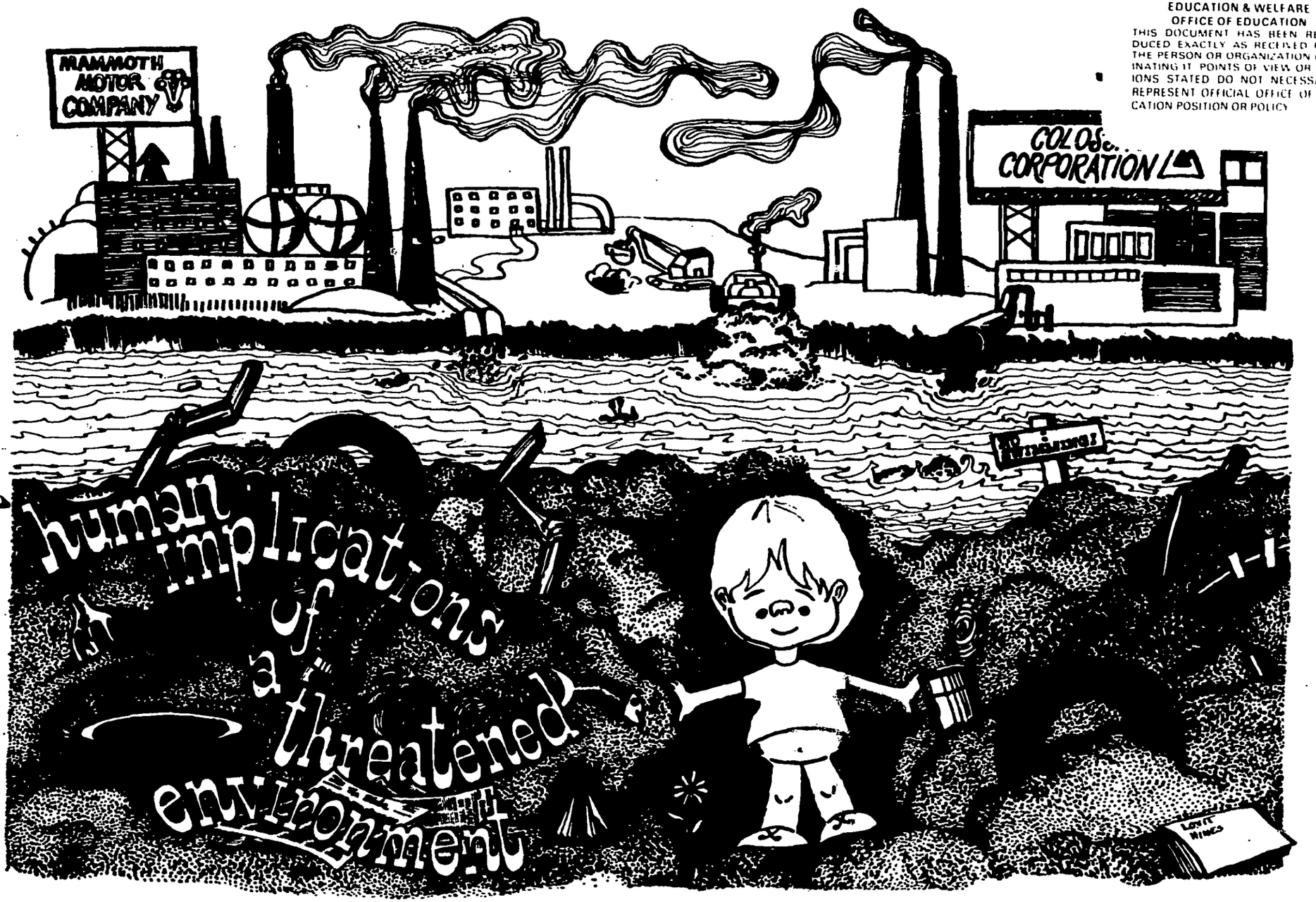
TITLE Social Studies Resource Units.
INSTITUTION Brevard County School Board, Cocoa, Fla.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE 72
NOTE 296p.

EDRS PRICE MF-$0.65 HC-$9.87
DESCRIPTORS *Environment; Human Relations; Instructional Materials; Problem Solving; *Resource Units; *Secondary Grades; *Social Studies; *Teaching Guides
IDENTIFIERS ESEA Title III

ABSTRACT

Based on the premise that fundamental solutions to environmental problems must include social solutions, these three resource units are designed to study the interrelation of man and nature as part of the social studies curriculum. A series of inquiry questions are posed with the intent of stimulating students to find solutions to our environmental crisis. The inquiry and problem solving approach seeks to: (1) build a framework of reference to attain an understanding of the causes and effects of our present environmental crisis, (2) attain an awareness of both the beauty and ugliness of our environment, (3) develop a sense of pride and social responsibility for the preservation of our planet, (4) foster a realistic identity with the social problems relating to our environment, (5) create the desire to become involved in finding solutions to these problems, and (6) realize the importance of attitudes toward making advances in the human conditions. Each of the units, Technology and Our Environment, Man vs. Nature, and Responsible Social Action Toward Our Environment, is sub-divided into inquiry questions, learning activities, resource materials, possible evaluation techniques, teacher suggestions, student comments, and teacher comments. A resource bibliography is included. This work was prepared under an ESEA Title III contract. (BL)

SE 014 917



BREVARD COUNTY SCHOOL BOARD

Clark Maxwell, Jr., Chairman
S. K. Baker, Jr.
G. W. Hedman
Mrs. Norman R. Keegan
Mrs. Louise Taylor

Dr. Wayne H. White
Superintendent of Schools

R. Dale Weizenecker
Assistant Superintendent for Instruction

AREA SUPERINTENDENTS

Gordon Crouch, Central
John Forbes, North
Dr. G. J. Wheeler, South

SOCIAL STUDIES RESOURCE UNITS

Special Pilot Testing Material

Developed by the Social Studies Environteam

as a portion of the

Title III, ESEA Project DOE, #050-723003-2322

"BROAD SPECTRUM ENVIRONMENTAL EDUCATION PROGRAM"

R. L. Henry, Chairman ..... Environmental Staff
Norma Lee ..... Carroll Elementary School
Carl Misener ..... Edgewood Junior High School
Bill Patkus ..... Satellite High School
June Schmidlkofer ..... DeLaura Junior High School
George Willis ..... Southwest Junior High School

Dr. Clair W. Bemiss, Director
Center for Environmental Education

The work presented or reported herein was performed pursuant to a grant from the United States Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not necessarily reflect the position or policy of the United States Office of Education, and no official endorsement by the United States Office of Education should be inferred.

PURPOSE

Ours is an intricately organized, urbanized, industrialized and nuclear-armed society. By taking over the earth from nature, man has created an environmental crisis which is rooted in the very character of the society which develops and uses technology.

Out of man's advancements have grown satisfaction, luxury, and comfort. The sheer comforts we have developed for ourselves pose formidable implications for the future. In an effort to create a material Utopia, the seeds of our scientific and technological growth may have been sown on fallow ground.

We pollute the air we breathe, the water we use, the foods we consume. We erase the wilderness and replace it with our own designs. We have overpopulated the world until strife, rioting, uncertainty and hunger are common.

It is the intent of the Units which follow to present Inquiry Questions designed to stimulate students to seek solutions to our environmental cirsis. There is a growing need for educators to provide the climate for the development of a social concern in both the identification of problems and the application of responsible action.

Through inquiry and problem solving, it is hoped the student and teacher will:

1. Build a framework of reference through which they may attain an understanding of the causes and effects of our present environmental crisis.
2. Attain an awareness of both the beauty and the ugliness of our environment.
3. Develop a sense of pride and social responsibility for the preservation of our planet.
4. Foster a realistic identity with the social problems relating to our environment.
5. Create the desire to become involved in finding solutions to these problems.

6. Realize the importance of attitudes toward making advances in the human conditions.

The suggested activities and materials are given as a possible springboard to a broader spectrum of study.

Based on the premise that fundamental solutions to environmental problems must include social solutions, the inter-relation of man and nature can be a vital part of the social studies curriculum. It is with an awareness of the distrubing vulnerability of man's natural environment that the following Units are offered.

TABLE OF CONTENTS

FORWARD

These units on environmental questions were designed to be incorporated within the secondary social studies program only if the teacher desires it. It is hoped that sometime during the year the students or the teacher will discuss environmental control and how the students might, in the future, be involved in solving some of these problems.

The student, if possible, should be the acting participant throughout these units. The inquiry or discovery method of learning is stressed. However a teacher may not wish to follow this procedure and it is to be understood that the teacher may choose to use a more formal classroom arrangement. It is left entirely to the discretion of the teacher.

The Inquiry Question is placed at the top of the page with four sub-divisions under it. These are Learning Activities, Resource Materials, Evaluation and Teacher Suggestions. Each has been correlated and inter-related where possible. The Inquiry Questions could be used as an entity unto itself as each logically follows the other.

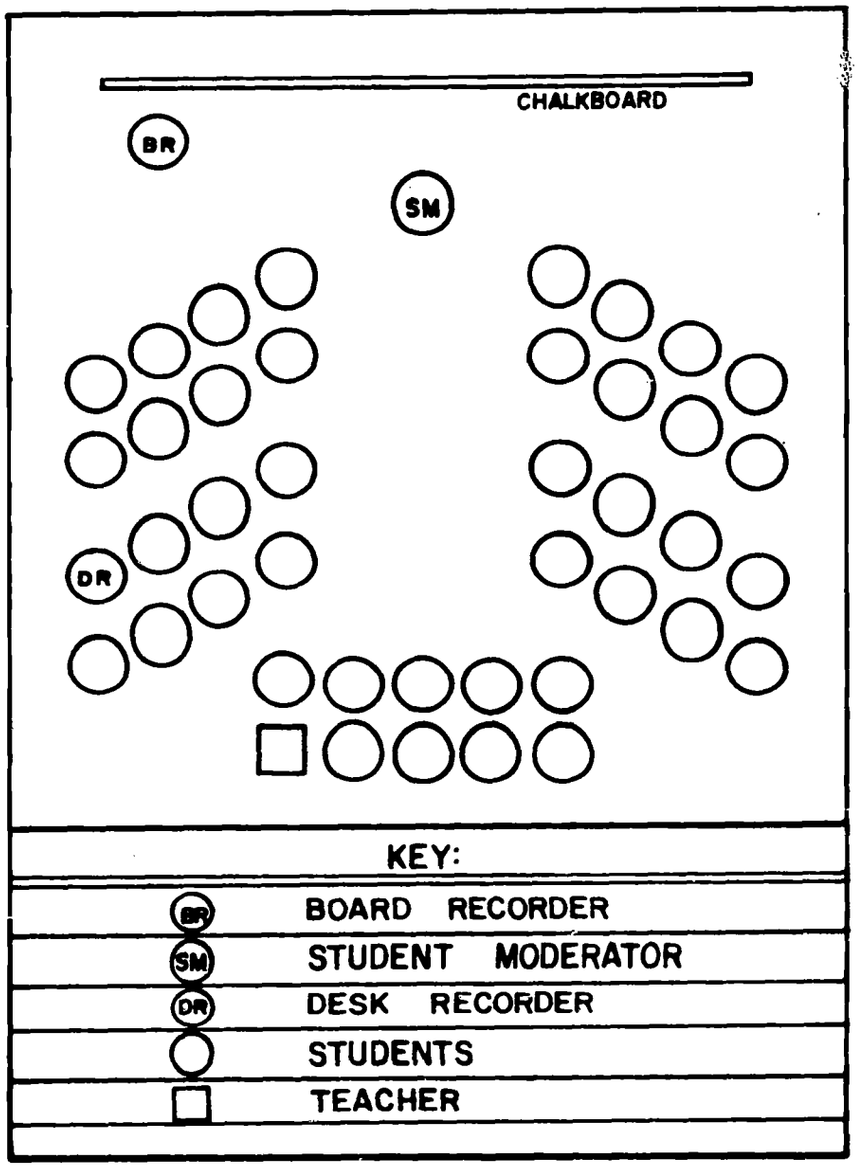
As the teacher reads through this unit, it will be observed that in the Resource column there is placed a title such as "Student Comment" (SC) or "Teacher Comment" (TC). These sections will follow each unit and the teacher will be given further ideas or readings that will assist him and the students in arriving at conclusions to the Inquiry Questions.

In some cases, one may not have the film or filmstrip available so an alternate suggestion has been made as to how the discussion may be initiated.

DISCUSSION FORMAT. In using the discovery or inquiry method of learning, it is of the utmost importance that the teacher refrain as much as possible from voicing opinions. Some students need the

confidence to voice their opinions and substantiates it by reason without fear of being criticized. In many instances, when a teacher makes a statement, the student accepts it immediately and will not attempt to think critically for himself. Therefore, try to slip into the background but always strive to have some challenging questions to ask, if the need arises.

One technique for a student-oriented discussion is to have a student moderator, board recorder and desk recorder. These positions would all be voluntary and no one should be forced. The moderator, if possible, sits at a table in the front of the room, and his purpose is to call on the other students, to voice no opinion, to count the vote when students have tried to reach logical conculsions in answering the Inquiry Question. If a student questions a concept that has been written on the chalkboard, it is not the moderator's responsibility to answer the question but rather to elicit the answer from the student who first brought up the idea or concept under discussion. The board recorder's (B.R.) responsibility is to write words, ideas and concepts on the chalkboard as directed or suggested by the other students. The board recorder (B.R.) may take part in the discussion when recognized by the moderator (M). The final member of this team is the desk recorder (D.R.). This student keeps a record of all the information that is on the chalkboard for each discussion period. It is the desk recorder's (D.R.) responsibility at the following class sessions to place the information on the chalkboard so that students know where the discussion had ended the previous day. There should be a new moderator (M) and board recorder (B.R.) for each class session, but the desk recorder (D.R.) should remain the same during the time for answering the Inquiry Question. The desk recorder (D.R.) should write or type on a ditto master the conclusions or answers to the Inquiry Question so that each student may have a copy of the conclusions drawn by the students.



Arrangement of the class environment for discussing inquiry questions is important. Desks could be arranged in a way that students can interact in the discussion. (see diagram at left) As the students carry on the discussion, a teacher is better able to evaluate each student in the class. A teacher may devise his own method of evaluation as the discussion progresses. A teacher could put participation points drawn in their grade book for outstanding suggestions, pertinent questions, keeping to the point, organization of the material on the ditto master, given by students. Moderators, desk and board recorders should also be given points for following through on their tasks. A teacher is able to evaluate each student every day of discussion. In this technique of evaluation, students are rewarded for thinking constructively and critically.

ACKNOWLEDGEMENT

My gratitude is extended to the Environteam for their tireless efforts in developing these Resource Units. The money earned is hardly enough compensation for the long hours and difficult assignments required to make this project a success. My personal thanks are given to Norma Lee, Carl Misener, Bill Patkus, June Schmidlkofer, and George Willis for a job well done.

I also acknowledge, with the deepest of appreciation, the secretarial assistance rendered to this project. The false starts, changes, pressures, and various details were handled admirably by Mrs. Joan Creech, Mrs. Dottie Riley, and Mrs. Patsy Higgins.

Last, but by no means least, special thanks is given to Lovit Hines, Merritt Island High School, for his superb illustrations which greatly enhance the overall effect of the materials.

Roger L. Henry, Chairman
Social Studies Environteam

SOCIAL STUDIES RESOURCE UNIT ONE: TECHNOLOGY AND OUR ENVIRONMENT

INQUIRY QUESTIONS

Inquiry Question: I. WHAT DOES THE WORD TECHNOLOGY MEAN TO YOU?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. VIEW FILM 1. After viewing film, students comment on types of technology observed. 2. List identified items on chalkboard. (NOTE: If film is unavailable, have students bring in magazine and newspaper pictures of their ideas of technology) B. DISCUSS 1. Use small group discussion to develop students' definition of technology. a. Place each definition on chalkboard. b. Have students comment on each definition. 2. Use large group discussion to see if one definition would satisfy the group through compromise.	A. VIEW FILM 1. "Signs of the Times" 2. For copy of film see Coordinator, Communications Media, Communications Department, Brevard County School Board. B. DISCUSS Dictionaries, encyclopedias, other reference books.	A. VIEW FILM For homework students will collect pictures of technology from magazines and newspapers. B. DISCUSS 1. Students analyze all definitions, stressing good and bad points of each. 2. If other classes are defining technology, have each class analyze those definitions.	A. VIEW FILM 1. Any film of this nature will be appropriate. 2. A list may include machines, assembly lines, power, skilled workman, computers. a. If a list, see if students can categorize them in some way. b. Or organize these ideas into generalizations about technology. B. DISCUSS 1. Two standard definitions of technology: - "The application of science, especially to industrial or commercial objectives." - The American Heritage of the English Language. - "Industrial science; the science of systematic knowledge of the industrial arts, especially of the more important manufacturers." Webster's New International Dictionary.

Inquiry Question: I. WHAT DOES THE WORD TECHNOLOGY MEAN TO YOU?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
			2. For this and all other activities, some system should be devised for students to retain all final conclusions/ generalizations to Inquiry Question.
C. READ/DISCUSS 1. Read paragraph on "technology." Student Comment (SC) # 1. 2. Discuss how well the paragraph fits the classes' definition of technology.	C. READ/DISCUSS Student Comment (SC) # 1, page 27.	C. READ/DISCUSS Teacher Comment (TC # 1, page 59.	C. READ/DISCUSS
D. MAKE A COLLAGE 1. Class works in small groups or individually. 2. Using pictures brought to class, make a collage on technology.	D. MAKE A COLLAGE	D. MAKE A COLLAGE 1. Teacher Comment (TC) # 2, p. 60. 2. Display on bulletin board.	D. MAKE A COLLAGE

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1: A. VIEW CARTOON 1. Show political cartoon to the class. 2. Ask students questions like the following: -What does this cartoon show us? -What area of the world is it depicting? -What do the symbols represent? -What general message is it trying to get across? -Do you agree or disagree with the message?	A. VIEW CARTOON SC # 2, page 28.	A. VIEW CARTOON TC # 1, page 59.	A. VIEW CARTOON TC # 3, page 61 , TC # 4, page 62 , give some general background to this Inquiry Question.
B. LIST 1. Divide class into small groups. 2. Using the collages on the bulletin board as an added stimulus, have students compile a list of beneficial and detrimental effects of technology on our way of living.	B. LIST If collages were not made in earlier Activity, pictures of various industrial activities should be provided.	B. LIST Collect each groups list and evaluate contents.	B. LIST
C. REPORT/DISCUSS/LIST 1. Each group reports their list to the class. 2. Class discusses the appropriateness of each item offered.	C. REPORT/DISCUSS/LIST	C. REPORT/DISCUSS/LIST 1. TC # 5, page 65. 2. TC # 1, page 59.	C. REPORT/DISCUSS/LIST

Inquiry Question:	II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE? A. What effects of technology have been beneficial to our life style? B. What effects of technology have been detrimental to our life style?		
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
3. Combine reports and make one master list of the beneficial and detrimental effects. Activity # 2: A. LIST Ask students to list major industries of America on chalkboard. B. RESEARCH 1. Divide class into small groups and allow them to select one of the industries for investigation. 2. Assign group to research both the beneficial and detrimental effects that their selected industry has on our way of living. C. REPORT 1. Each group reports results of their investigation. 2. Reports are to be accompanied by some form of visual aid to assist the understanding of the oral presentation.	A. LIST B. RESEARCH School research center or selected materials which give a balanced view of technology (books, magazines checked out from local public library). C. REPORT 1. Old magazines, pictures, news clippings, art materials for drawing, paper, colored pencils, etc. 2. School owned camera equipment, if available, otherwise	A. LIST TC # 1, page 59. B. RESEARCH 1. Daily checks can be made on progress of work in library or class. 2. Collect and evaluate any written assignment. C. REPORT 1. TC # 5, page 65. 2. TC # 2, page 60.	A. LIST Industries similar to the following may be listed: -Petroleum -Transportation -Communication -Steel -Utilities B. RESEARCH C. REPORT 1. When possible, allow students to use evaluation forms to grade other students work, both oral and visual. 2. Suggested visual aids: -Cartoons -Clipped pictures -Drawings

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
	use students camera.		-Charts -Graphs -Photographic layout
D. DISCUSS Through class discussion, attempt to arrive at a general conclusion to the Inquiry Question.	D. DISCUSS	D. DISCUSS TC # 1, page 59.	D. DISCUSS 1. Allow students latitude in discussing what they think is beneficial/detrimental. 2. Always ask student for "justification" (Why do you think this is beneficial/detrimental?)
Activity # 3:			
A. READ/DISCUSS 1. Display for and have students read this typical American motto: "America First" 2. Have students explain the meaning of the motto, by answering questions similar to these: -First in what? -Why is it good to be first? -Is there any way in which being first could be bad? 3. Record answers on chalkboard.	A. READ/DISCUSS	A. READ/DISCUSS TC # 1, page 59.	A. READ/DISCUSS
B. READ/DISCUSS 1. Allow students to read quotation by Arnold Glasow. 2. Class discusses these ques-	B. READ/DISCUSS "It used to be that folks hoped to see America first. Now	B. READ/DISCUSS TC # 1, page 59.	B. READ/DISCUSS

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE? A. What effects of technology have been beneficial to our life style? B. What effects of technology have been detrimental to our life style?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
tions: -What is meant by the quotation? -Do you agree or disagree with the quotation? Why? Why not?	we're hoping to see it last."---- Arnold Glasow.		
C. READ/DISCUSS 1. Read SC # 3. 2. Class discusses these questions: -Is technology always beneficial to man? -Have you become aware of adverse effects? -If so, what effects are adverse to our life style?	C. READ/DISCUSS SC # 3, page 29.	C. READ/DISCUSS TC # 1, page 59.	C. READ/DISCUSS
Activity # 4:			
A. RESEARCH 1. Have each student locate one example of beneficial and detrimental effects of technology. 2. Record examples and source of information on 3x5 cards.	A. RESEARCH 1. Issues of periodicals, newspapers up to two years old can supply information. 2. These may be obtained at home, school or public libraries.	A. RESEARCH Collect 3x5 cards and evaluate completion of assignment and content.	A. RESEARCH 1. Keep 3x5 cards in an index file for future reference for this and other classes. 2. After grading 3x5 cards submitted, index each according to teacher's own file system for future students' reference. 3. Students should have access to these files and be aware of filing system used.

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE? A. What effects of technology have been beneficial to our life style? B. What effects of technology have been detrimental to our life style?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
B. REPORT Students report their examples to class. C. DISCUSS/LIST 1. Class discusses the examples and opinions to determine a conclusion to the Inquiry Question. 2. Final record of answers should be listed, reproduced, and distributed to class. Activity # 5: A. INVITE A SPEAKER 1. Ask one or more guests from any of the categories to speak in your class on the subject of the Inquiry Question. 2. Divide class into small groups. 3. Prior to speaker's arrival, have each group research his organization's basic policies and activities. 4. Report findings to class 5. Based on knowledge from re-	B. REPORT C. DISCUSS/LIST A. INVITE A SPEAKER 1. Suggested categories of speakers -local industry -utility company -Sierra clubs -Isaac Walton League -Conservation 70's 2. When speaker is contacted, ask for	B. REPORT TC # 5, page 65. C. DISCUSS/LIST TC # 1, page 59. A. INVITE A SPEAKER 1. If research is written, collect and evaluate. 2. TC # 6, 7, 8, and/or 9, pages 66-69. 3. TC # 5, page 65. 4. Questions composed for speaker could be collected	B. REPORT C. DISCUSS/LIST 1. Final lists (Section C) should be typed on ditto masters by class secretary and a copy distributed to each student in class for future reference. 2. If more than one class is being taught the same subject, finalized lists from each should be made available for comparison of other classes with their own lists. A. INVITE A SPEAKER 1. When possible, allow students to contact prospective speakers. 2. Send copy of prepared questions to speaker, but allow and encourage spontaneous questioning.

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
ports, students compose questions concerning good/bad points of technology in general (specific questions for representatives of particular industry or utilities.) 6. When speaker arrives, hold a simulated "Meet the Press" type conference, with students asking questions.	written information describing their organization be sent in advance.	and evaluated. 5. TC # 1, page 59.	
B. WRITE After guest leaves, have each student write as specific an answer as possible to the Inquiry Question.	B. WRITE	B. WRITE Collect and evaluate written paper.	B. WRITE
Activity # 6: A. TAKE A FIELD TRIP 1. Organize field trip to demonstrate answer to the Inquiry Question. 2. Students should observe, take notes, sketch, or photograph local examples of technological effects.	A. TAKE A FIELD TRIP	A. TAKE A FIELD TRIP	A. TAKE A FIELD TRIP Teacher should select locations each of which provides a varied parorama of the local environment: a. Clear point on hill overlooking town where entire town and suburbs can be seen. b. Area of new industrial construction in rural or residential area. c. Modern shopping center in residential

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
			area surrounded by older, small, privately owned stores. d. Old "factory town" area, such as Pullman, Ill., company owned housing area. e. Two comparative areas: (1) modern suburban area where modern Industrial Park factories can be viewed. (2) Old industrial area with close-by housing. Bus route for class trip should be planned to include, in passing, as varied a view of local environment as possible. Stops at each point in trip should be limited to 10 or 15 minutes.
B. REPORT 1. Each student designs a class presentation which tells what he saw and felt. 2. Presentations may be visual, impressionistic, or oral (student chooses). 3. Give report.	B. REPORT	B. REPORT TC # 5, page 65 , TC # 2, page 60 .	B. REPORT Teacher may wish to comment on diversity of viewpoints which may be in the outcome of this common experience.

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 7: A. CONDUCT SURVEY 1. Students prepare survey to obtain opinions of teachers, administrators, other students and possibly community adults on the Inquiry Question. 2. To understand surveying, students should read an explanation of surveying. 3. Complete survey activities are explained in SC # 5.	A. CONDUCT V SURVEY 1. SC # 4, page 30. 2. SC # 5, page 31. ties)	A. CONDUCT SURVEY 1. If teacher wishes, he could quiz reading assignments. 2. TC # 6, 7, 8, and/or 9 pages 66-69. 3. Overall product results of groups 1 and 2 may be evaluated. 4. Group 3 - evaluate written interpretation.	A. CONDUCT SURVEY
B. REPORT/DISCUSS 1. Results of survey presented to class. 2. Class arrives at general conclusion to Inquiry Question.	B. REPORT/ DISCUSS	B. REPORT/ DISCUSS TC # 5, page 65.	B. REPORT/DISCUSS
Activity # 8: A. SHOW PICTURES Ask students to observe the displayed pictures of technology.	A. SHOW PICTURES Pictures of various devices which are results of technology can be found in any popular magazine.	A. SHOW PICTURES	A. SHOW PICTURES Teacher should collect pictures and make a bulletin board display.

Inquiry Question: II. HOW DOES TECHNOLOGY EFFECT OUR LIFE STYLE?
A. What effects of technology have been beneficial to our life style?
B. What effects of technology have been detrimental to our life style?

Learning Activities	Resources	Evaluation	Teacher Suggestions
B. READ Have students read news articles related to technological effects.	B. READ SC # 6, 7, and 8, pages 32-34.	B. READ	B. READ
C. DISCUSS/LIST 1. Class discusses the following: a. the role each pictured object plays in our lives (good/bad points) b. the evidence of technology's detrimental effects from the news articles. 2. Class makes list of effects (beneficial/detrimental) technology has on our lives.	C. DISCUSS/LIST	C. DISCUSS/LIST TC # 1, page 59.	C. DISCUSS/LIST Retain list for future use.
D. MAKE A VISUAL Have students make a poster or draw a cartoon which illustrates the effects (beneficial/detrimental) of technology.	D. MAKE A VISUAL	D. MAKE A VISUAL 1. TC # 2, page 60. 2. Essay test describing effects (beneficial/detrimental)of technology.	D. MAKE A VISUAL

Inquiry Question:
III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?
A. How does something become typical in our culture?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1: A. VIEW FILM 1. Show film depicting cultural aspects of America. 2. After film, tell class the film (and collages from earlier activities) shows what is typical of our culture.	A. VIEW FILM 1. "America, I Know You" 2. Order for purchase from the following: Bomar 622 Rodier Glendale, California 91201	A. VIEW FILM	A. VIEW FILM 1. Order film well in advance of use and preview it. 2. Any film of this nature would be appropriate.
B. DISCUSS/LIST 1. Divide class into small groups. 2. Have each group discuss and list answers to these questions. -What does culture mean? -How does something become typical?	B. DISCUSS/LIST	B. DISCUSS/LIST 1. TC # 6, 7, 8, and/or 9. pp. 66-69. 2. Teacher could collect list and evaluate.	B. DISCUSS/LIST TC # 10, page 70 , gives a general background for the entire Inquiry Question.
C. REPORT/DISCUSS 1. Each group reports list to class. 2. Class agrees on a general meaning to culture and a general procedure for something becoming typical.	C. REPORT/DISCUSS	C. REPORT/DISCUSS 1. TC # 5, page 65. 2. TC # 1, page 59.	C. REPORT/DISCUSS

Inquiry Question:
III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?
A. How does something become typical in our culture?

Learning Activities	Resources	Evaluation	Teacher Suggestions
D. READ Have students read a definition of culture.	D. READ SC # 9 page 35.	D. READ	D. READ
E. REVISE Class compares reading with their definitions and revises if necessary.	E. REVISE	E. REVISE TC # 1, page 59.	E. REVISE

Inquiry Question:

III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?

B. What elements of our culture have degraded our environment ?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1:			
A. DISCUSS 1. Divide class into small groups. 2. Ask each group to define "quality environment."	A. DISCUSS	A. DISCUSS TC # 6, 7, 8, and/or 9, pages 66-69.	A. DISCUSS
B. REPORT/DISCUSS 1. Each group reports their definition to class. 2. Class arrives at one general definition.	B. REPORT/ DISCUSS	B. REPORT/ DISCUSS 1. TC # 5, page 65. 2. TC # 1, page 59.	B. REPORT/DISCUSS
C. READ Have students read a description of a "quality environment " and the "quality of life."	C. READ 1. SC # 10, page 36. 2. SC # 11, page 38.	C. READ	C. READ TC # 14, page 85.
D. REVISE Class compares readings with their definition and revises if necessary.	D. REVISE	D. REVISE	D. REVISE
Activity # 2:			
A. READ Have students read essays on the auto and the SST.	A. READ SC # 12, 13 pages 40-41	A. READ	A. READ

Inquiry Question:

III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?

B. What elements of our culture have degraded our environment?

Learning Activities	Resources	Evaluation	Teacher Suggestions
B. VIEW FILM Show film on the automobile.	B. VIEW FILM 1. "Automobiles --The Great Love Affair" (CBS News) 2. In the Brevard County Film Library - #12A-362; # 12B-363.	B. VIEW FILM	B. VIEW FILM
C. DISCUSS/LIST 1. Divide class into small groups. 2. Each group makes a list of ways the auto and the SST degrades our environment.	C. DISCUSS/LIST	C. DISCUSS/LIST TC # 6, 7, 8, and/or 9, pages 66-69.	C. DISCUSS/LIST
D. REPORT/DISCUSS 1. Each group presents their list to class. 2. Class develops a composite list of the reports.	D. REPORT/ DISCUSS	D. REPORT/ DISCUSS TC # 5, page 65.	D. REPORT/DISCUSS
E. MAKE A COLLAGE 1. Assign for homework. 2. Make a collage which represents ways auto and SST degrade the environment.	E. MAKE A COLLAGE	E. MAKE A COLLAGE TC # 2, page 28.	E. MAKE A COLLAGE A collage is an eye-poem of pictures, words or phrases designed to have an immediate effect on the viewer.

Inquiry Question:

III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?

B. What elements of our culture have degraded our environment?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 3:			
A. READ/REACT Place Richard Armour's quotation on board and let students react to it.	A. READ/REACT Consumer's Prayer - "Give us this day our daily bread, free of cadmium, mercury and lead." -- Richard Armour	A. READ/REACT TC # 1, page 59.	A. READ/REACT TC # 11, page 74.
B. VIEW FILMS Show filmstrips, films which depict degardation of our environment.	B. VIEW FILMS 1. Films - "Changing Cottonland" (8-28) - "Erosion-Leveling the Land" (8-592) 2. Films from Brevard County Film Library	B. VIEW FILMS	B. VIEW FILMS 1. Any current films showing effects of pollution would be effective. 2. Preview films/filmstrips so that questions that tie in with all previous questions can be posed.
C. DISCUSS Class discusses how film answers the Inquiry Question and arrives at general conclusion.	C. DISCUSS	C. DISCUSS TC # 1, page 59.	C. DISCUSS
D. DRAW A CARTOON 1. Have students draw cartoons depicting examples of air, water, and land pollution. 2. Display	D. DRAW A CARTOON	D. DRAW A CARTOON Collect and evaluate.	D. DRAW A CARTOON

Inquiry Question:
III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?
C. Which elements of our culture that degrade the environment could we change?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1: A. RESEARCH 1. Divide class into small groups of students. 2. Students will research the question," What can we do without?" B. DISCUSS 1. Class discusses the results of the group research. 2. Class reaches consensus. 3. Students make copy of consensus list. 4. Using the above list, next discuss, "what are we willing to do without?" 5. Students make copy of results. C. CONDUCT SURVEY 1. Use lists from above to construct a survey to conduct in school or community. 2. See Inquiry Question II, Activity # 7, for procedures.	A. RESEARCH Use school library. B. DISCUSS C. CONDUCT SURVEY	A. RESEARCH If teacher wishes, written reports could be collected. B. DISCUSS C. CONDUCT SURVEY See Inquiry Question II, Activity # 7.	A. RESEARCH 1. Teacher needs to keep research closely tied to elements which directly affect our environment. 2. Editorials similar to TC # 12, page 80 , should stimulate student discussion of what could or should be changed. B. DISCUSS C. CONDUCT SURVEY

Inquiry Question:
III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?
C. Which elements of our culture that degrade the environment could we change?

Learning Activities	Resources	Evaluation	Teacher Suggestions
D. WRITE 1. Have students use the above lists and write a short story showing what the world would be like without one or more items on the list. 2. Have representative ones read in class or posted on bulletin board. OR	D. WRITE	D. WRITE Collect and evaluate.	D. WRITE
E. GIVE A PLAY 1. Divide class into small groups and select certain aspects from the lists composed above. 2. Each group will prepare and act out what life would be like without that aspect.	E. GIVE A PLAY	E. GIVE A PLAY 1. TC # 6, 7, 8 and/or 9, pages 66-69. 2. Subjective evaluation of the ideas presented.	E. GIVE A PLAY Keep each group's plans and activities secret so audience will be more attentive.
Activity # 2:			
A. REVIEW/DISCUSS/LIST 1. Review pictures, films, cartoons, etc, from previous activities. 2. Divide class into small groups and have students make a list of cultural elements which may degrade the environment.	A. REVIEW/ DISCUSS/LIST	A. REVIEW/ DISCUSS/LIST TC # 6, 7, 8, and/or 9, pages 66-69.	A. REVIEW/DISCUSS/LIST In this discussion, encourage students to list ideas and beliefs, as well as tangible items that may lead to environmental degradation.

Inquiry Question:

III. HOW DO OUR CULTURAL ELEMENTS CONTRIBUTE TO ENVIRONMENTAL DEGRADATION?

C. Which elements of our culture that degrade the environment could we change?

Learning Activities	Resources	Evaluation	Teacher Suggestions
B. WRITE Have each group write a description showing each of the following: 1. Which cultural elements could be changed to improve the environment? 2. How could these changes be made? 3. What adjustments to our lifestyle would these changes make?	B. WRITE	B. WRITE Collect and evaluate.	B. WRITE It may be helpful to direct attention to the earlier periods of this century before none of the elements listed were developed as an aid to helping students comprehend their life style under changed conditions.
C. REPORT/DISCUSS 1. Have each group report their description to the class. 2. Class then will decide on a general answer to the Inquiry Question.	C. REPORT/DISCUSS	C. REPORT/DISCUSS 1. TC # 5, page 65. 2. TC # 1, page 59.	C. REPORT/DISCUSS
D. MAKE VISUALS Have students make charts, collages, cartoons, etc, that illustrate the classes' general conclusion.	D. MAKE VISUALS	D. MAKE VISUALS TC # 2, page 60.	D. MAKE VISUALS

Inquiry Question:

IV. HOW HAS TECHNOLOGY OFFERED SOLUTIONS TO OUR ENVIRONMENTAL PROBLEMS?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1: A. VIEW CARTOON Have students look at cartoon and react to its meaning. B. READ/DISCUSS 1. Have students then read news article which accompanied above cartoon. 2. Class discusses the article and re-evaluates meaning of cartoon. C. ASK 1. As a transitional question, pose this query: - In what other areas are solutions for pollution proposed? 2. Allow student answers and examples. D. READ/DISCUSS 1. Have students read about recycling as another area of technical solution. 2. Allow class to discuss the article.	A. VIEW CARTOON SC # 14, page 46. B. READ/DISCUSS SC # 15, page 47. C. ASK D. READ/DISCUSS SC # 16, page 51.	A. VIEW CARTOON B. READ/DISCUSS TC # 1, page 59. C. ASK D. READ/DISCUSS TC # 1, page 59.	A. VIEW CARTOON Teacher could collect similar cartoons for a bulletin board. B. READ/DISCUSS TC # 13, page 82. C. ASK D. READ/DISCUSS

Inquiry Question:
IV. HOW HAS TECHNOLOGY OFFERED SOLUTIONS TO OUR ENVIRONMENTAL PROBLEMS?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 2: A. WRITE LETTERS 1. Each student will select a local, national, or international, organization or industry. 2. Student will write to his selection for this information as it relates to the Inquiry Question. a. problems the addressee has encountered. b. Solutions (proposed and attempted) c. achievements (conclusive or contemplated) 3. Students request available public relations pamphlets. B. RESEARCH Each student will investigate his selection for information about its operations in this area which would be considered embarrassing. C. REPORT 1. After letter is answered and research is completed, each student will report his findings to the class. 2. To assist his presentation, student will collect news articles and advertisements which depict accomplishments of organization being studied.	A. WRITE LETTERS 1. Addresses for organizations can be located in many local libraries in telephone directories for various cities. 2. National Tuberculosis Association is a possible organization for information. B. RESEARCH School and public libraries (government reports, Facts on File, Readers'Guide) C. REPORT Advertisements from periodicals, newspapers, radio, TV. (Tape recorders may be used to record TV and radio ads)	A. WRITE LETTERS 1. Collect and evaluate. 2. Evaluation based on these: -form -clarity of content -neatness B. RESEARCH If written work is required, collect and evaluate. C. REPORT TC # 5, page 65.	A. WRITE LETTERS 1. Do not attempt to alter or censor student's letter. Help only with form, spelling, etc. 2. Students choosing local concerns may wish to arrange interviews with representatives. 3. Example of pamphlets: "A Primer on Air Pollution" by Mobile Oil Co. B. RESEARCH Investigations of the selected company per se may be impossible, in which case the industry is to be researched. C. REPORT

Inquiry Question:
IV. HOW HAS TECHNOLOGY OFFERED SOLUTIONS TO OUR ENVIRONMENTAL PROBLEMS?

Learning Activities	Resources	Evaluation	Teacher Suggestions
D. DISCUSS Following reports, class discusses information presented in order to reach a general conclusion to Inquiry Question.	D. DISCUSS	D. DISCUSS TC # 1, page 59.	D. DISCUSS
E. INVITE SPEAKER 1. Invite local speakers to talk about how technical solutions to environmnetal problems have already been applied, plans for future application, and the problems involved. 2. Have students compose questions for the speaker remembering their earlier readings and discussions. 3. When speaker arrives, allow time for question/answer period.	E. INVITE SPEAKER Suggested local sources: -Utility companies -Industry -Engineer (private and government) -Chamber of Commerce	E. INVITE SPEAKER 1. Collect and evaluate composed questions. 2. TC # 1, page 59. ,during question/answer period.	E. INVITE SPEAKER 1. Have student composed questions sent to speaker prior to his arrival. 2. Have speaker's attention drawn to local examples when possible.
F. DISCUSS After speaker leaves, class discusses remarks and comes to general conclusion to Inquiry Question.	F. DISCUSS	F. DISCUSS TC # 1, page 59.	F. DISCUSS 1. When possible, have students make a list of local places which have used solutions or need solutions. 2. Emphasize information received on future plans and problems. -In what new areas or ways can technology be utilized?

Inquiry Question:
IV. HOW HAS TECHNOLOGY OFFERED SOLUTIONS TO OUR ENVIRONMENTAL PROBLEMS?

Learning Activities	Resources	Evaluation	Teacher Suggestions
G. READ To remind students that some critics don't think technology is the best answer read SC # 16.	G. READ SC # 16, page 51.	G. READ	G. READ
H. VIEW AD/DISCUSS 1. Show Monsanto advertisement (SC # 18). 2. Have class discuss, in relation to reading, what problems may be behind this ad.	H. VIEW AD/DISCUSS SC # 18, page 56.	H. VIEW AD/DISCUSS	H. VIEW AD/DISCUSS Recognize that no problems may be evident in this particular ad. Locate other ads that may reveal problems.
I. COLLECT Have students collect ads which clearly illustrate the problems presented in the reading	I. COLLECT	I. COLLECT Collect and evaluate.	I. COLLECT

STUDENT COMMENTS

STUDENT COMMENT NO. 1 : Technology

Technology in simple language means making the tools and machinery that man has invented work for him and produce more of the things he needs without him having to perform hard manual labor. Man is the only animal that has learned how to do this.

Man's curiosity, in most cases, caused him to discover the sources of power and energy. The presence of electricity, the power of the sun's rays, the power produced by damming a stream have been developed rapidly and without such power being harnessed man could not have advanced very far. Another new source of power by splitting of the atom could not have been accomplished without prior discoveries in producing electricity. No doubt, there are many more undiscovered sources which will have great effects upon life upon the earth and other planets. Man's search for such will never end. Our technological way of life has benefitted every individual. Because of research, we have better health, better housing, better food and clothing and eventually man will discover how to control the weather. When this happens millions of acres of desert can be turned into arable land to produce the foodstuffs for the world.

STUDENT COMMENT NO. 2

2/14/69

"O BEAUTIFUL FOR SPACIOUS SKIES, FOR AMBER WAVES OF GRAIN,
FOR PURPLE MOUNTAIN MAJESTIES, ABOVE THE . . ."

Don Wright, Miami News

STUDENT COMMENT NO. 3 : Television Impact

There is something...about television that I would like to throw out for your consideration because of its impact on our people, and that is television fiction--the programs you and I and our children watch.

This impact has nothing to do with violence or sex, or bad taste. Instead it has to do with the nature of the television program itself. Most TV programs are 30 minutes or an hour long. They all have one thing in common. At the beginning of the program they build a problem. Maybe it's minor, but often it is the problem of peace or war, of famine, or law and order. But regardless of its magnitude, 30 or 60 minutes later, the problem is solved.

Every day and every night for most of their lives your children and mine have watched the major problems of the universe solved in 30 to 60 minutes.

Is it possible--and I throw this at you as a question, not a conclusion--is it possible part of the unrest in this country, part of the dissatisfaction with government and with our leaders is that, as far as our children are concerned, they do not solve problems fast enough? The smog that is here today is here tomorrow. And so is the civil rights problem. And so is the war. And you name it. In real life problems are solved and go away very slowly. Are our children having trouble separating the immediacy of television from the reality of life? Are they demanding more than we can ever deliver, or more than they will ever be able to deliver? Is TV creating a frustration with reality that can only be relieved by threats and demands for change, and that failing, by violence?

I don't know the answer but I suggest that we think about it.

Sen. Bob Dole, Republican National Chairman, in a Tucson, Arizona, address.

STUDENT COMMENT NO. 4 : Conducting A Survey

Surveys and questionnaires are very common. You or other members of your family may have had some personal experience with one of these. Many of these studies are designed for a specific practical purpose and are carried on for the benefit of a business establishment. There are also several well-known public opinion polls, conducted by organizations that specialize in such work. Do you know the name of any poll of this type? Do you have any notion of what is involved in conducting such a poll?

Whether they are intended for commercial or for scientific purposes, surveys must be set up with great care, if they are to be valid and useful. Since they all depend on mere samplings of the population, much attention must be devoted to the makeup of the sampling. Otherwise, there is a danger that the truth will be distorted. For example, suppose a researcher wishes to learn how Americans feel about the matter of divorce. He may be able to obtain his answers by questioning a relatively small number of people, provided the group he has selected comprises a representative cross-section of the total population. It should include, for example, a balanced assortment of men and women; of inhabitants of large cities, small towns, and rural areas; of individuals representing various income and educational levels; and of members of religious groups opposed to divorce, as well as those which accept it.

Similarly, the wording of a questionnaire requires great care to make sure that it is clear and that the questions are not "loaded"--that is, calculated to evoke a particular kind of response. In the case of face-to-face interviews, the use of well-trained interviewers is essential.*

* Sociology for High School, Suzanne Harris Sankowsky, Oxford Book Col, New York, 1971

STUDENT COMMENT NO. 5 : Survey Activities

Students should be divided into three groups with each group having the following responsibilities:

(1) This group will select the questions to be asked on the survey from among suggestions submitted by the entire class. They will prepare and print the survey form.

(2) This group will organize the distribution, filling out, and collection of the survey. It will be their responsibility to obtain permission (if needed) from administration, teachers, etc.; physically distribute survey forms; inform those answering surveys of any special instructions for answering survey questions; and, finally, to collect survey forms and deliver to group three.

(3) This group will be responsible for collating the answers on the survey; analyzing these answers, and preparing a report on the "raw" results; they will also analyze answers and provide written interpretations of the significance of the overall survey and the overall conclusions they have obtained from the results of the survey.

Sample Questions:

1. (Check one); Do you think modern technology:
   ( ) (a) has helped you more than it has harmed you
   ( ) (b) has harmed you more than it has helped you
   ( ) (c) has had no effect on your life
   ( ) (d) has changed your life, but neither helped nor harmed it...
2. If technology has been beneficial to you, list the areas where you think it has helped you the most:

STUDENT COMMENT NO. 6 DDT • Detrimental

A bill to outlaw the use of DDT in California beginning in 1972 is being considered by the Legislature. Supporters of the bill argue that DDT is not breaking down, that it soaks into the soil and is washed out to sea, where it is now being found in large amounts in fish and shellfish all over the world. Birds and other animals that eat fish or plants sprayed with DDT are affected. Often the birds die or their eggs lack calcium and do not hatch. The shellfish industry in some parts of the world is also being threatened. Birds eat many more times their weight in DDT-affected food than does man, but we cannot be sure that man is safe from the bad effects of DDT either.

Yet DDT is the only known pesticide guaranteed to protect seventeen of California's crops, and California's biggest industry is agriculture. Farmers say five to eight years will be needed to develop an alternative and that they cannot do without DDT meanwhile. Thus a feud is developing, mainly between wildlife conservationists on the one hand and the Department of Agriculture on the other.

Ironically, however, DDT can only be used for a few more years in California anyway because the insects against which it is used are rapidly becoming immune to it. It has already been abandoned by public health officials because it no longer affects flies or mosquitoes, for example.

" Hot Battle Over DDT Looms in California," by John Berthelsen, The Washington Post, July 20,1969

42

STUDENT COMMENT NO. 7 : DDT • Beneficial

Stories of frightful conditions supposedly resulting from the use of DDT are now common in the news media. Rather than become overly emotional in our reactions, we must look at all the facts. It is not clear that DDT is indeed responsible for the death of fish or the premature cracking of eggs, for example. A study in England showed that DDT actually made the eggshells of finches thicker, and a U.S. federal water pollution report for 1967 indicates that the big killers of fish are the waste and raw sewage which pollute our waters rather than pesticides. These other factors receive less publicity and are more difficult to solve so people have made DDT the villain. Studies have also shown that DDT is not building up in the human body in sufficient amounts to be dangerous.

On the other hand, world health and man's food supply depend heavily on the use of DDT. It has doubled world food production in the last twenty-five years and saved millions of lives by making it possible to control or eliminate diseases such as malaria, yellow fever, river blindness, or typhus (which killed more soldiers in World War I than did the fighting). It is far safer than any chemical which would replace it, and nonchemical pest control is not well enough developed yet to be used instead.

Excessive use of any pesticides can be harmful and should be stopped. A sudden sharp cut in the use of DDT, however, would seriously affect world health as well as man's food supply.

"DDT: Millions of People Owe Their Lives to It," by Max Sobelman, Los Angeles Times, July 6, 1969

STUDENT COMMENT NO. 8 : Industrial Wastes

Despite long-standing laws which prohibit dumping of industrial wastes into Cleveland's Cuyahoga River and the protests of antipollutionists such as Cleveland's Mayor Carl Stokes, industrial plants located along the river continue to receive dumping permits from the State of Ohio. Small spot fires from oil slicks have long been common but have always been quickly put out. Recently, however, a fire from an especially large slick got out of control and destroyed $50,000 worth of property. The mayor is now threatening to bring suit against the State of Ohio to prevent further granting of permits. Anti-pollutionists hope the seriousness of this latest fire will encourage the public to press for tighter controls.

"It Finally Happened. The Cuyahoga River Caught on Fire Last Month." The Christian Science Monitor, July 11, 1969.

STUDENT COMMENT NO. 9 : Culture

Culture means a way of life peculiar to a group, a society, a nation, or to ethnic groups.

Man, in his never ending search for a better way of life developed different social characteristics. His discoveries led him to closer associations with his fellowman. He learned to work as a team or group in order to accomplish his aims. This also led to his need to live with and be near his associates, hence villages, towns and cities. One man alone could accomplish little but several minds and hands working together gave him success. Dependent upon the need, each group, nation and country developed their own type of culture. Culture is made up of many customs, beliefs and laws most of which came from religious beliefs, superstitions and natural phenomena.

STUDENT COMMENT NO. 10 : A Quality Environment

What is developing in this country is a greater awareness both of man's dependence and of his independence.

We are realizing our dependence on the intricate web of nature of which we are part. We have discovered that man's continued existence depends on the functions of microscopic bacteria and fungi and on the grand natural cycles which govern the flow of the major elements through the environment.

Man is also coming to understand his relationship with the urban environment he has created--from the parks and open space to the quality of its buildings and the character of its neighborhoods. The harshness of much of the inner city environment and the cruel effects of improper sanitation, air pollutants and household hazards such as lead in paint have been recognized. If we are to be concerned about the quality of life, it will not be possible to escape the city and cloak ourselves in pastoral romanticism. For as we concern ourselves with the quality of our natural environment, we must give equal attention to the quality of our man-made environment.

Much of the current concern over environmental problems has sprung from a negative reaction to the degradation we have inflicted upon our surroundings. Much of it has sprung from a fear that we will destroy ourselves if environmental insults go unchecked. These reactions and fears are legitimate--environmental degradation degrades us, and the possibility of an ecological "doomsday," although often exaggerated, does exist.

But it is important to consider the positive side of the struggle for environmental quality. Our environment is literally what surrounds us--what we see and feel and smell every minute of every day. If life is to be worth living, the environment must do more than sustain life. It must provide the esthetic

satisfaction and the sense of human dignity which give meaning and purpose to existence.

...the environmental problem is everybody's problem--we are all affected by bad air, polluted water, or despoiled land. And the environmental opportunity--the possibility of protecting and shaping our surroundings so that they accord with our vision of the good life--is ours to take if we have the will and persistence

There are those who doubt that we will have the will and persistence, and who believe that concern with the environment is simply a passing fad. But the evidence is to the contrary. The problems are real. All of us are paying the costs of a degraded environment daily, through being surrounded by dirt and ugliness. Our values and perceptions have come to demand better. We have realized that our resources are limited, and that our natural surroundings cannot tolerate the unlimited burdens placed on them by an industrialized society. As leisure time and educational levels have increased we have placed a higher value on recreation, esthetics, and the things which make for a better life.

47

STUDENT COMMENT NO. 11 :Quality Of Life

There are elements without which (although we turn stone into steel and plankton into the bread of life) we are clods, numbers on a machine, our eyes forever vacant of dreams. Their loss will truly make us less than men.

How much are we willing to pay in the coin of soul and mind for our own indulgence in overbreeding and our condoning of it in the rest of the world? Will we pay with loss of choice, with queuing, jostling, elbowing, with yet unimagined traffic snarls, a tragic increase in cripples and defectives, a vaulting incidence in mental illnesses and crime, a new tax burden to support the more than 50 per cent juvenile population, a strangling of culture while the stark necessities of existence absorb our energies?

Said the late Editor-emeritus Edward Meeman of the Memphis Press-Scimitar, "To live rich, thrilling, joyous life, not hardly-worth-living existence, we need space." Are we, then, ready to accept a permanent condition of inadequate educational facilities and congested housing while we watch a once beautiful America being transformed into a demented wasteland? Are we content with roads upon roads upon roads that go nowhere-because there is no place to go? Do we glory in wading in wastes and sitting on stoops of houses that grow every year more conformist, shoddy, and makeshirt? Do we want increasing noise and din, mountains of junk on our horizons in place of mountains of trees? Do human dignity and privacy mean nothing to us? How much are we willing to pay for our support of quantity instead of quality?

Americans have never known the misery of having nowhere to turn, no place to go, just to be alone and to breathe freely. Yet since we do not believe in mass immolation or sacrificial massacre the only escape from such misery is its prevention. All measures must be taken before the exigency; once here, there is nothing to do but endure it.

Professor Bruce Welch of William and Mary College deplores the passive acceptance of population expansion while we devise frantic means to provide for its demands. "Simple arithmetic should suffice to show that this approach is madness and folly," says the noted biologist in National Parks Magazine. "Animals are not simple machines for the consumption of food. Each kind, including man, has behavioral and physiological limitations of one sort of another." Then he adds: "Far short of the population density that will tax potential food supply there will be a limit to human tolerance, the advent of social and cultural stagnation, the disappearance of freedom-and compassion-and sensible morality, the reign of an artificially tranquilized and emotionless sub-animal existence."

Robert Rienow and Leona Train Rienow, Moment in the Sun, The Dial Press

49

STUDENT COMMENT NO. 12 : The Dangerous Automobile

The automobile and the American public are locked in a life and death struggle. The car is robbing the American people of their land, air, minds, and their very lives. It is becoming increasingly clear that solution of the transportation-automobile problem is of high priority if we are to come to terms with the environment, and with ourselves.

The recent record of public transportation in the United States is appalling. Once we had choices. For local transport we could decide to use streetcars, ferries, buses, trolleys, cars, or rapid transit. For travel over longer distances there were trains, buses, cars, ships, planes. The range of alternatives has rapidly been diminishing, and increasingly we are left with the two most wasteful and destructive forms of travel--the private automobile and the plane.

Since 1950, the railroad track used for passenger service decreased from 150,000 to 68,000 miles, electric railway track fell from 9,600 to 790 miles; many ferry routes were eliminated; the last American-flag passenger liner crossed the Atlantic--the list goes on. Requests by railroads to the Interstate Commerce Commission to decrease or curtail passenger service have been commonplace. During the same period, streets and highways increased by almost 400,000 miles-from 3.3 million to 3.7 million miles.

It is not clear that this trend accurately represents the preference of most travelers. The Metroliner, a new high-speed train between New York and Washington has been quite successful. The number of daily trips has been tripled since service began in the beginning of 1969. In the words of public relations men, "there has been a great public acceptance of this mode of transport"--which is to say that people dig it. They'd rather go to Pennsylvania Station in downtown Manhattan and get on a fast train which

will leave on time rather than take a taxi or limousine to the airport (a half-hour trip), wait in the air terminal (fifteen to forty-five minutes), etc. If they also knew that the train burned less fuel, used less land, and created less air pollution--and understood what these facts mean in their own lives and those of their children--air travel between New York and Washington, and by extension between all cities separated by less than five hundred miles, would become an historical curiosity.

The technology to operate 150-mile-per-hour trains is presently available. (It is being used in Japan.) We in the United States have not seen it because, under a curious system of priorities, federal transportation funds are going to the supersonic transport and the federal highway system. In December, 1969, President Nixon proudly signed a bill assigning $300 million to the Department of Transportation for grants toward development and construction of rapid transit and other public transportation facilities. (The new San Francisco Bay Area rapid transit system alone cost $1.2 billion.) Through the sixties, an average of more than $3 billion annually was spent by the federal government on highway construction--ten times the amount now belatedly being spent on public transport. Large sums are being pumped into wasteful, inefficient, and destructive modes of transportation while environmentally sound systems are allowed to languish and atrophy. This pattern must be reversed if we are to survive.

Kenneth P. Cantor, "Warning: The Automobile Is Dangerous To Earth, Air, Fire, Water, Mind, and Body."

STUDENT COMMENT NO. 13 : The S S T

The supersonic transport (SST) stands as a monument to the United States' nationalistic ego, government catering to corporate profit, a virtual religion of technology and a steadily deteriorating environment. So claims outspoken SST critic Breen Stilley, who sees the proposed new aircraft as a symbol of misguided national priorities.

Answering the claim that the SST will improve living standards, Stilley points out that the most it will achieve is a negligible saving of time for a small fraction of the world's population, while imposing an immense financial, physiological and psychological burden on the rest. He observes that although the SST is designed to fly at three times the velocity of present jetliners (1800 m.p.h. instead of 600), most of the time gained would be lost in stack-ups and traffic jams at the air terminals anyway. Taking into account all delays before takeoff and after landing, the door-to-door travel time of a trip from New York to London has been estimated at 11 hours by conventional jet, eight hours on the SST. The difference is only 27 per cent.

Stilley sets forth and then attacks several arguments presented by pro-transport forces. For example, many claim that sales of SST's to foreign airlines would improve the United States' balance of payments. But much of the gains would be offset in fares paid by American businessmen and tourists to the foreign airlines. It has also been argued that the development of the SST would create many jobs. True, Stilley admits, but the jobs created would be for highly trained workers, often simply transferring from one aerospace position to another, rather than for the area of real need -- less-skilled workers. National pride and prestige are other important factors in the development of the SST; since France and Britain are building the Concorde and Russia the Tu-144, shouldn't we keep pace? Not unless we take pride in degrad-

ing our own environment, is Stilley's reply.

According to Stilley, however the underlying cause for the development of the SST is neither jobs nor nationalism but profit. Cost estimates on the SST range as high as $3.5 billion, much of it earmarked for Boeing and its subcontractor. Stilley cites an article by Donald F. Antrhop, written in the Bulletin of Atomic Scientists (May, 1969), which stated, "The whole SST program is an economic boon-doggle, the prime beneficiary of which is the aircraft manufacturing industry."*

Ironically, however, the whole venture seems in danger of financial ruin. At least 300 Boeing SST's must be sold (at $40 apiece), if the airlines is to profit. Up till now, the airlines have placed tentative orders for only 122 of the aircraft, with no additions over the past two years. The Institute for Defense Analysis came to the conclusion that if supersonic travel is restricted to flight over bodies of water, only 120 to 200 planes will be sold.

Not only are the potential advantages of the SST extremely limited, Stilley argues, but heavily outweighed by serious dangers to the environment. Of foremost concern are the shock waves, or sonic booms, which affect a 50-mile swath below the plane's trajectory for the entire time it is cruising above the speed of sound (this would apply to approximately 2000 miles of a 25,000 mile trip.) The total area affected, would be 50 times 2000 miles, or 100,000 square miles -- equal to about 10 times the area of Massachusetts. Government studies on the effects of sonic booms over three cities (St. Louis, Oklahoma City, and Chicago) has yielded extensive evidence for damages caused by the booms. Claims totaled over a quarter million dollars. SST booms can crack and shatter glass windows, crack plaster, masonry, tiles, foundations and fragile objects such as antiques or works of art. There have been two instances of rockslides caused by sonic booms over canyons in the West, including one which caused irreparable damage to ancient Indian cliff-dwellings at Canyon de Chelly National Monument in Arizona.

The cumulative effect of sonic booms would not be limited to property damage, Stilley declares.

The extremely loud noise actually caused permanent loss of hearing to a woman in England. While this was an extreme case, the constant high level of noise pollution which would accompany regular SST flights would be bound to have injurious effects upon human beings -- both physiological and psychological. Heart patients would be endangered by "startle reactions" to the deafening sound, which comes without warning. Light sleepers would be awakened continously.

The combined threat of property damages and public resistance would make it highly unlikely that SST's be flown at supersonic speeds over populated areas. But to be economical for airlines, they would have to be flown across the continents -- most likely over sparsely populated areas. Although this would lessen the number of people affected, it would ultimately have the effect of ruining the last unspoiled regions of the earth. And even if flown over water the SST would have an adverse effect on people on boats - passenger liners, the merchant marine, and many fishermen. Is it fair to inflict upon rural dwellers and ocean-goers what city residents won't tolerate?

A secondary environmental consequence of the SST would be the emission of enormous amounts of carbon dioxide and water vapor into the atmosphere above the prevailing winds. An ecological imbalance would inevitably result from the undispersed gases, and although the precise effects are not known, they could include a blanketing effect which would alter the climate.

Stilley concludes his argument by comparing the SST with the new "jumbo" jets. The Boeing 747, for example, carries more passengers (400 vs. 280) over a longer range (6300 miles vs. 4000 miles), and at fares lower than present rates (whereas the SST fares are expected to be from 15 to 25 per cent higher). Traveling at subsonic speeds, the jumbo jets do not carry the threat of sonic booms. The only possible advantage of the SST is it's speed in flight, much of which would be offset by other considerations explained above. Moreover, none of the present problems plaguing air travel, such as congested air lanes, overburdened air traffic control systems, processing delays at airports and noise pollution, would be alleviated

by the SST. In fact, most would probably be aggravated by the introduction of the new aircraft.

In conclusion, Stilley urges the United States to abandon its prestige and profit-prompted development of the SST and assume instead a worldwide stand on behalf of the majority of citizens who value a healthful environment more than a quicker flight across the Atlantic.

---

* Brenn Stilley, "The SST," The Environmental Handbook, (March, 1970, New York), p.179.

STUDENT COMMENT NO. 14

STUDENT COMMENT NO. 15 : New Car Stall? Could Be Anti-Smog Device

On cold winter nights, Al Waters, an Allied Chemical Corp, vice-president from New York, puts his 1972 Cadillac "to bed" by stretching an electric blanket over the hood.

He said he loves his new car except for one thing. He has trouble getting it running when it's cold--hence the effort to keep it warm with the electric blanket.

The New York businessman's experience with the Cadillac may seem unusual for a new car. But the problem has become a common one to buyers of 1971-72 cars because of the new air pollution control systems. It is a problem for all the manufacturers.

Isadore Birnbaum, a Detroit pharmacist, recently bought a new 1971 Lincoln Continental and complains it keeps stalling. Noting he has a $6,500 car and can't keep it running, he says, "You start the car and, after a minute of driving, it dies on you."

"It drives me nuts. I'm afraid of getting hit in the back. The dealer service manager is a nice guy who tries his best but says it's the anti-pollution equipment."

Dr. Arthur Millman of Farmington, Mich., says his 1971 Plymouth Fury III "stumbles and chokes out when it's cold. The other day, it stalled in the middle of Grand River Avenue on the way to work. They blame the pollution-control device."

He referred to the changes the manufacturers have made in engines the past few years to comply with federal anti-smog standards designed to control emissions of hydrocarbons, carbon monoxide and oxides of nitrogen. The result of the changes has been to make some cars undrivable.

Service representatives for the two biggest auto divisions--Ford and Chevrolet--say customer complaints about drivability represent their No. 1 problem.

The customers are more concerned about not being able to keep their cars running in the manner they expect than they are about reducing air pollution.

"I am in more danger of getting clipped on the highway when I stall in traffic than I am in strangling on bad air," says Dr. James Hruska of Union Lake, Michigan.

"I have a Dodge with 19,000 miles on it, and it stalls incessantly, particularly when cold. My dealer tells me his car does the same thing--that it is the inherent nature of the beast because of the new systems."

Mrs. Perl M. Mead, of River Rouge, Michigan, says her 1971 Chevrolet Nova "stalls at every stop sign and traffic light."

Harriet Hogan, a Detroit officeworker, said her 1971 Ford Torino stalled so often in traffic one night that "a policeman stopped me and asked if I could drive because I kept stalling."

Trying to keep the cars running is the major problem facing drivers, but another is a plain old loss of horsepower.

For example, William Dillon, a Detroit attorney, says his new 1972 Chevrolet station wagon doesn't have the performance of the 1969 Ford wagon he traded in, even though the engines are of comparable size.

The cars don't have the performance because, in many cases, the engine compression ratios and horsepower have been lowered so the power plants can run on low-octane unleaded regular-grade gasoline instead of the high-octane premium fuel formerly used in power plants in big cars. Unleaded gas is being phased in because advanced anti-smog systems being planned for 1975 require it.

Who is to blame for the present state of affairs?

Some auto men point the finger at Washington. They say congressmen and federal administrators have gone too far too fast with automobile pollution control rules which have outstripped the industry's

ability to come up with practical solutions.

One auto man said, "If the people think they have problems now, they have no conception of what is coming in a few years. There is nothing engineers are working harder on. But the trouble is the engines are already tuned so finely that everybody driving is affected."

On the other hand, some industry critics suggest the auto companies didn't move fast enough to clean up the engines and, as a result of this poor planning, the customers are now paying the penalty in the form of poor performance on their new cars.

The cold driving problem is caused by the fact that the engines run on a lean fuel-air mixture to reduce emissions. If it were not for this, they would run on a richer mixture when cold and there would be no cold driving problem. In other words, engines now are not getting enough gas.

It is not only the carburetor mixture, but the spark plug timing which has been changed. Sometimes there is also a hot driving problem, when the engine stumbles in the heat. Ford is also working on a new temperature compensating system to adjust the amount of fuel under both cold and hot conditions.

59

Another problem with the engines in recent years has been dieseling-a condition where the engine continues to fire even after the ignition has been shut off.

Engineers have gotten around that now by adding a solenoid switch which closes the throttle when the ignition is turned off. This eliminates the dieseling.

Paul McKee, a top engineer with Ford's Emission Control Office, says, "yes, we could have used more time to develop these systems. We are breaking our necks to keep performance from getting worse, and we hope to see some improvements."

However, next year all cars will have systems to control emissions of oxides of nitrogen (now on California cars) in addition to the present systems to limit hydrocarbon and carbon monoxide emissions.

In 1975-76, the manufacturers are mandated by law with coming up with systems to reduce pollution by 90 per cent from current levels. About 80 per cent of the pollutants have already been eliminated. The firms say they don't know how to meet all the 1975-76 rules.

Because of the present systems and those being proposed, fuel economy is dropping. "One of the things we try to do is get the best economy and performance while still meeting the emission levels," he said. "We try to make the best trade-off we can."

"Part of the education process is to inform the public that, if they like clean air, there is going to be a penalty for it."

The Miami Herald, January 2, 1972

STUDENT COMMENT NO. 16 : Recycling

America has been described as a nation knee-deep in garbage, firing rockets to the moon. This phrase aptly points out the misguided priorities of the American government as well as the magnitude of the solid-waste crisis. Many solutions to the solid-waste, or trash, problem have been proposed--sanitary land fill, dumping waste into old mines, compressing it into building blocks, incineration, and dumping at sea. Even the best of these methods waste materials. The principle of recycling is to regard wastes as raw materials to be utilized; this is the only ecologically sensible long term solution to the solid-waste problem.

Recycling is a major part of the solution of many environmental problems. It is important to air and water pollution and to wilderness preservation. The environmental crisis has come into the public consciousness so recently that the word "recycle" doesn't even appear in most dictionaries. The core of its meaning is that resources be used over and over again and cycled through human economic-production systems in a way that is analogous to the cycles of elements (carbon, nitrogen, phosphorus, etc.) in natural eco-systems. This is directly contrary to the present produce and discard production system with its one-way flow of materials from the mine or farm through the household and into the garbage dumps, air, and water.

The benefits of reuse of materials (recycling) in our overcrowded world are obvious. Each ton of paper, aluminum, or iron reclaimed from waste is a ton less needed from our forests and mines, and a ton less solid waste in our environment. Recycling of many important materials is now technically feasible and major corporations are devoting some attention to it.

Aluminum is very easy to recycle because it need only be melted down for reuse. Because of

aluminum's very high value, large-scale recycling operations are now feasible. Currently, scrap aluminum brings $200 per ton where scrap newspaper brings only $5 per ton. Reynolds Aluminum has been running ads stressing its interest in recycling aluminum cans; plants to accept used cans for recycling are now being built.

Paper and cardboard can also be recycled. Remember the paper drives of past years? The price is now so low that scrap paper is not economical to reuse unless it is delivered to the mill in large quantities by very cheap labor. But demands on our forests have become so great that there is now pressure for more intense management of timber to increase annual production. Those of us who prefer wilderness and maximum areas of unmanaged forests would prefer that the demand for timber be reduced by increasing the percentage that is recycled. Current research on improving the techniques is being done by U.S. Forest Products Laboratories. More recycling of paper means less pressure for increased cutting in the forests.

At present, however, the reuse or recycling of solid wastes is not economically feasible for most materials. Since it is ecologically necessary to start recycling our solid wastes, our approach is to find ways to make recycling economical.

Suitable legislation can go a long way toward doing this. At the state or federal level, legislation should incorporate the cost of disposal of each product in its price in the form of a tax. By giving a competitive advantage to products with a lower tax, this tax would encourage the use of simple bio-degradable or easily recycled containers, such as those made out of paper, cardboard, and aluminum, and also reusable bottles and containers. It would discourage the use of plastic containers of types that cannot be recycled and of containers made of a mix of materials that are very difficult or impossible to recycle, such as paper and plastic laminated together or foil-covered cardboard.

The tax can be collected either at the factory or at time of purchase depending on the circum-

stances. The revenues gained from this tax would go into a fund to subsidize recycling of products. The amount of tax would be determined by the subsidy needed to make recycling economically feasible. For example, aluminum, being economically recyclable, would require no subsidy. Paper, if its recycling required a two-cent-per-pound subsidy, would carry a two-cent tax. Products that could not be recycled at all would carry a tax equal to the full direct and social costs of ultimate disposal after use.

To properly recycle our wastes will require an industry perhaps as large as the present automobile industry. Recycling-plants can provide people with socially useful jobs, increase the resource base, and improve the quality of life for everyone.

There are two major barriers to recycling wastes. The first is the problem of transporting the wastes to the site of the recycling. This is an economic problem which the subsidy will solve. The second is getting wastes sorted. The subsidy can be high enough to pay for this, or each city might establish a dual set of garbage rates, which people could choose between freely. One rate would be for unsorted garbage. The other rate would be for garbage separated into organic wastes, glass, and metal, and into plastic, paper, and cardboard. The difference in the two rates would simply be the cost to the municipality of sorting the garbage. There may be objection to having to sort or pay, but it is time to realize that this is one of the costs we have to pay for a decent environment.

This legislation represents a specific application of the economic theory of externalities. Instead of the usual practice of including only the cost of production in the price of a product, we also include any additional social cost-such as the cost in environmental deterioration-in the price of the product. This removes the incentive to industries to follow practices which save them money in the short run but produce environmental destruction in the long run.

Garrett De Bell, The Environmental Handbook, Ballantine Books, Inc.

STUDENT COMMENT NO. 17 : Advertising And The Environment

We... see vast advertising expenditures for spectacular technological antidotes, appearing everywhere. The hottest growth industry is in the field of anti-pollutants, air cleaners, water cleaners...or high yield chemicals to get the soil to produce more than it naturally would...all of which in my own view, have the effect of reinforcing an already suicidal tendency in a society dazzled by technology's feats to believe that technology will itself cure its own self-invented sickness.

I am prepared to believe it can in some isolated cases, such as in capture of polluting wastes in some industries, but in general, I doubt that the answer lies with more technological innovation.

All this industrial hustle to fix things up by more and better gadgets and chemicals is just one more example of man forever bringing rabbits to Australia, as Dave Brower has described it.

The cure always causes a new scourge of its own.

Take antibiotics. According to some people, they will soon kill off enough of the weaker virus strains to leave us with only a killer virus.

Or high yield wheat strains. Though they do keep some people fed for a bit, what else do they do? To the soil. To the wheat. To the people who eat it and to the plant life around it. We don't know, but I'm afraid we'll find out soon enough.

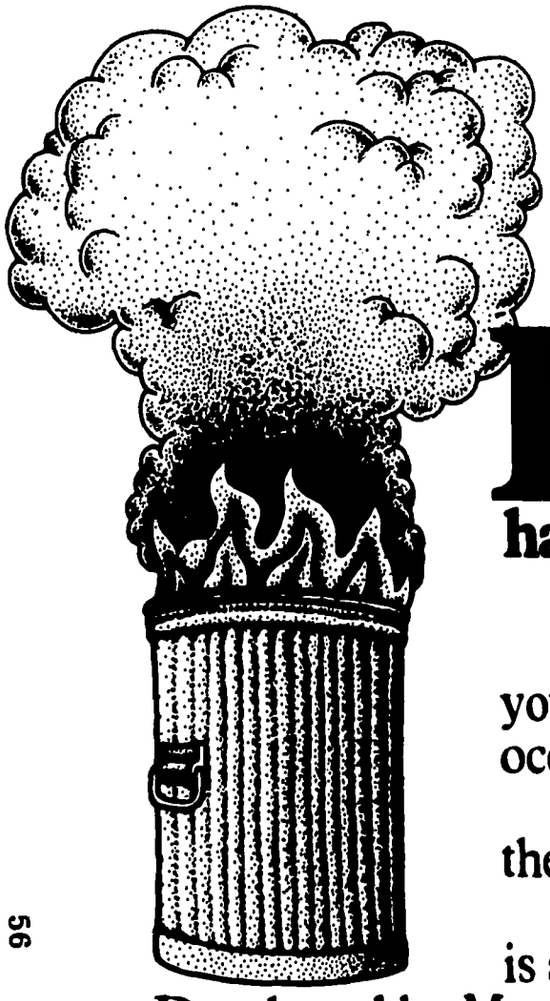
And now we find hundreds of thousands of advertising dollars being spent by companies girding themselves for the big gold rush in the oceans. The ads proclaim how everything in the world is just fine because of the "infinite" resources in the oceans...food and mineral wealth. They don't recognize, yet, that there is no such thing as infinity, and even if there were, industry's other hand is busily pulling infinity back in this direction by killing off the ocean's resources with DDT and garbage and a hundred other

creations at a rate which is increasing faster than population.

I am prepared to bet that the ultimate answer to ecological problems is not cleverer technology. It will probably be less technology, at least of a certain sort, and I never would have thought five years ago that I'd be coming out on the side of the Luddites today.

Unlike them, however, I am not saying we should tear down factories, or that there should be no technology. Naturally. But I am saying there should probably be a lot less of it, and less people to be served by it of course, but most important, less emphasis on increase, starting now. Less emphasis on acquistion and material wealth as any measure of anything good.

excerpt from "Media and Environmental Awareness," by Jerry Mander.



Burn garbage, and what have you got?

Airborne garbage.

Dump garbage, and what have you got? Less usable land. Or polluted oceans.

In all of history, these have been the only ways to dispose of solid waste.

Now, not a minute too soon, there is another way; Landgard™ system.

Developed by Monsanto's subsidiary Enviro-Chem, Landgard is a system that bakes garbage rather than burns it. And then, to avoid air pollution, it inhales its own gases and consumes them.

All types of municipal solid waste go into our process.

And what comes out is 94% smaller than what went in.

In the course of doing this, we can recover the metal for re-use. And we can use the energy produced by the system to make steam and electricity.

We've never seen a cleaner way to build our business at **Monsanto: the science company.**

FOR MORE INFORMATION ABOUT
MONSANTO'S ENVIRO-CHEM SERVICES.
WRITE BOX G5EBA3
MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO. 63166

STUDENT COMMENT NO. 18

56

TEACHER COMMENTS

TEACHER COMMENT NO. 1 : Participation Evaluation

The following checklist is offered as an example of a device which may be used to lend a degree of objectivity to evaluating student participation in class discussions. The teacher may involve students in the evaluative process by devising a rotation system whereby two or three students would evaluate class members during class discussion periods.

Only four simple catagories are employed in this checklist. More complex scaling may be included if the teacher wishes to discriminate among cognitive skills of the students, (i. e. recall, synthesis, analysis, etc.). However, this type of scale is not easily employed. The following catagories for evaluation are included in this suggested checklist:

1. Quantity of student contribution.
2. Content of student's remarks as these indicate knowledge of topic, critical and/or innovative thinking by student.
3. Relevance of student's remarks to subject under consideration.
4. Clarity of expression and presentation by student.

The evaluator may indicate quantity of student's remarks by simply placing a check in the appropriate column. The other categories should be rated on the following qualitative scale of 1-4.

1 - Poor (incorrect and/or inappropriate)
2 - Fair
3 - Good
4 - Excellent (complete and appropriate)

The following chart may be adapted for use in the evaluation described above. Simply record student's name when he initially participates and continue evaluation of any of his subsequent comments on same line. There is no need to record the student's name until the point of initial contribution.

NAME	QUANTITY	CONTENT	RELEVANCE	CLARITY
1. Sam Sunshine		3, 1, 2	4, 1, 3	3, 3, 3
2.				
3.				

TEACHER COMMENT NO. 2 : Evaluation Form for Visuals

There are four major areas of importance indicated on this form. Teachers who grade on a percentage basis should insert a value in each blank to determine the weight of each area in relation to the others, making the sum of all blanks on a perfect item total 100. Teachers using other systems (such as variable points) should determine the proper value of each area. Note: part 4 clarity, has four sub-areas which combine to make the total value for part 4. This form is intended as a suggested guide for teachers and/or students to evaluate visual presentations produced by students.

Student's Name_____ Title or Topic_____

VALUE	AREA OF EVALUATION
_____	1. APPROPRIATENESS If the student has had an opportunity to select either the topic or method of his presentation, is the choice of either or both appropriate to the assignment?
_____	2. ACCURACY Are the facts used in the presentation accurate? If not, where is the inaccuracy?
_____	3. COMPLETENESS Does the presentation represent a complete statement or coverage of the subject (Is there material or facts omitted which makes the presentation misleading) ? If not, where is the presentation lacking?
_____	4. CLARITY Is the presentation clear to the viewer? _____a. Is the viewer readily able to determine the point or message contained in the presentation? _____b. Is the presentation free from unnecessary distractions? (pictures, drawings, etc. which do not contribute to the purpose? _____c. Are the colors and sizes of lines, bars, and/or pictures suitable? _____d. In the case of a collage or drawing, is the focal point clearly determined?
_____	COMMENTS:_____
(Total Score)	

TEACHER COMMENT No. 3 :Effects Of Advanced Technology

Although man has always been a despoiler of his environment, the major environmental problems of today began with the Industrial Revolution late in the 18th century. Smoke belching from factory stacks and raw industrial wastes dumped into rivers became the signs of progress and production. Such conditions are no longer ignored as they once were, but the growth of the American economy continues to outpace the efforts to deal with its unwanted by-products.

The growth of the economy has been marked not just by greater production but also by a vast amount of technological change. Such changes, although they have in some cases provided new solutions to environmental problems, have also created a vast range of new problems. New chemicals, new uses for metals, new means of transportation, new fuels, new types of containers, new medical techniques, and new industrial processes all represent potential hazards to man and his surroundings. The pace of technological innovation has exceeded our ability to control its injurious side-effects.

It may be assumed that technological achievements in the future will bring with them threats of the environment that we cannot forsee now. This suggests that we may have to develop new standards for judging what is and is not truly "progress." We may have to reject, or at least to limit the use of, technological developments that work well in a purely industrial sense but that bring with them destructive side-effects that in the fullest sense of the term we cannot afford.

TEACHER COMMENT No. 4 :Technology*

Although many people point to specific situations as causes of pollution, as the authors of the previous readings have done, some say the cause is more basic. The author of the next reading states that technology, or the system that man has developed so he can produce more things faster, is the basic reason for our environmental crisis. He says that environmental pollution is not simple an incidental by-product of our technological progress, but rather an integral part of technology itself. Would you agree?

With startling suddeness environmental pollution has jumped to the top of the agenda of public concern. A short time ago the condition of the environment was largely a subject for discussion among scientists; although some of us did venture from our laboratories to alert the public and legislators to the problem, until recently the response was one of polite attention but little demand for remedial action. New, suddenly, things are different. Environmental pollution is a major public concern.

The immediate reasons for this concern are not difficult to detect, for they assail our senses every day: our eyes smart with smog; our ears throb with the noise of automobiles, aircraft, and construction tools; we are assailed by the odors of polluted waters and the sight of mounting heaps of rubbish.

Less apparent then the fact of pollution is what can be done about it. The problems are enormous in size: cities are running out of places to dump garbage and a lake as large as Erie has been nearly totally polluted. The problems are bewildering in their complexity: if we expand sewage treatment facilities, the effluent nourishes aquatic plants and we only intensify the pollution caused by rotting masses of algae; if we incinerate garbage, we intensify air pollution; if we attempt to control smog by means of exhause devices which reduce waste fuel emission, we worsen the pollution caused by nitrogen oxides.

The degradation of the environment in which we live has become a pervasive, intractable, discouraging problem. It clashes noisomely with the magnificent progress of the age, with the marvelous competence of our new machines, with the rising productivity of our factories and our farms, with the new inventions that have revolutionized communications and management.

Why has a society which is so enriched by the progress of technology now become so impoverished in the quality of the life which that technology supports? What are the causes of this dismaying phenomenon? What lessons can be learned from the environmental crisis that might help us survive it?

Consider this thesis, which, I believe, may provide some useful insights into these problems:

Environmental pollution is not to be regarded as an unfortunate, but incidental, by-product of the growth of population, the intensification of production, or of technological progress. It is, rather, an intrinsic feature of the very technology which we have developed to enhance productivity.

Our technology is enormously successful in producing material goods but too often is disastrously incompatible with the natural environmental systems that support not only human life, but technology itself. Moreover, these technologies are now so massively embedded in our system of industrial and agricultural production that any effort to make them conform to the demands of the environment will involve serious economic dislocation. If, as I believe, pollution is a sign of major incompatibilities between the systemof productivity and the environmental system that supports it, then, if we are to survive, it is the productivity system that must yield first place to environmental preservation, however severe and challenging to our social concepts that revised priority may be.

All living things, including man, and all human activities on the surface of the earth, including all of our technology, industry, and agriculture, are dependent on the great interwoven cyclical processes followed by the four elements that make up the major portion of living things and the environment: carbon, oxygen, hydrogen, and nitrogen.

All of these cycles are driven by the action of living things: Green plants convert carbon dioxide into food, fiber, and fuel; at the same time they produce oxygen, so that the total oxygen supply in our atmosphere is the product of plant activity. Plants also convert inorganic nitrogen into protein, a critical foodstuff. Animals, basically, live on plant-produced food; in turn they regenerate the inorganic materials--carbon dioxide, nitrates, and phosphates--which must support plant life. Also involved are myriads of microorganisms in the soil and water.

Altogether, this vast web of biological interactions generates the very physical system in which we live: the soil and the air. They maintain the purity of surface waters and by governing the movement of water in the soil and its evaporation into the air regulate the weather. This is the environment. It is a place created by living things, maintained by living things, and...essential to the support of living things.

The environment makes up a huge, enormously complex living machine--the ecosphere--and on the integrity and proper functioning of that machine depends every human activity, including technology. Without the photosynthetic activity of green plants there would be no oxygen for our smelters and furnaces, let alone to support human and animal life. Without the action of plants and animals in aquatic systems, we can have no pure water to supply agriculture, industry, and the cities. Without the biological processes that have gone on in the soil for thousands of years, we would have neither food crops, oil, no coal. This machine is our biological capital, the basic apparatus on which our total productivity depends. If we destroy it, our most advanced technology will come to naught, and any economic and political system which depends on it will founder. Yet, the major threat to the integrity of this biological capital is technology itself.

---

*Excerpted from Barry Commoner, "Salvation: It's Possible,"Reprinted from the April 1970 issue, "The Crisis of Survival,"of The Progressive Magazine, Madison, Wis..Reprinted by permission of the author.

TEACHER COMMENT NO. 5 : Evaluation Form For Oral Report
(To be filled in by students and/or teacher)

Subject of Report _____ Student reporting _____

I. Knowledge of subject matter and/or what way questions were answered.

_____a. Excellent (5 points) _____b. Good (4 points) _____c. Fair (3 points)

_____d. Poor (1 point) Points Earned _____

II. Presentation of material by using audio/visual aids. Evaluate each aid used from 0--5 points.

_____a. Charts _____b. Maps _____c. Graphs

_____d. Guest Speaker _____e. Slides _____f. Films

_____g. Filmstrips _____h. Table Display _____i. Study Guides

_____j. Puzzles/Games _____k. Skits _____l. Other

Points Earned _____

III. Equipment used in presentation. Evaluate each aid used from 0--5 points.

_____a. Opaque Projector _____b. Filmstrip Projector _____c. Overhead Projector

_____d. Film Projector _____e. Globe _____f. Chalkboard

Points Earned _____

IV. Speaker's attitude towards listeners, tone, and quality of voice should be considered. Evaluate as #1.

_____a. Excellent _____b. Good _____c. Fair

_____d. Poor Points Earned _____

V. Evaluation of the participation of the members of the groups. (Use where applicable)

_____a. Excellent _____b. Good _____c. Fair

_____d. Poor Points Earned _____

Total Points _____

TEACHER COMMENT NO. 6 : Small Group • Individual Evaluation

Date_____ Time_____ to_____ Problem_____ Participation_____

Excellent Poor	Item
1 2 3 4 5	1. Was well prepared for discussion
1 2 3 4 5	2. Used prepared outline properly
1 2 3 4 5	3. Kept running outline of discussion
1 2 3 4 5	4. Contributed readily at every opportunity
1 2 3 4 5	5. Contributions were presented at the proper time
1 2 3 4 5	6. Contributions were brief
1 2 3 4 5	7. Contributions were clearly stated
1 2 3 4 5	8. Showed evidence of a firm grasp of discussion theory
1 2 3 4 5	9. Used constructive reasoning rather than intentional reasoning
1 2 3 4 5	10. Demonstrated objectivity
1 2 3 4 5	11. Reasoned critically
1 2 3 4 5	12. Showed open-mindedness
1 2 3 4 5	13. Provided sources of facts and other bases for opinion readily
1 2 3 4 5	14. Answered questions asked of him readily
1 2 3 4 5	15. Listened well to contributions of others
1 2 3 4 5	16. Demonstrated an attitude of cooperation rather than competition
1 2 3 4 5	17. Talked clearly, distinctly and audibly
1 2 3 4 5	18. Courteous and respectful of others (didn't interrupt, etc.)
1 2 3 4 5	19. Encouraged others to contribute to the discussion
1 2 3 4 5	20. Assisted in providing leadership services
	Total Evaluation
1 2 3 4 5	Rating of total performance in relation to other members of the group
	Group Evaluation
1 2 3 4 5	Rating of the whole group in relation to other group discussions witnessed.

Instructions: Circle the number for each item that tends to represent your opinion about the quality of participation demonstrated.

Evaluator_____

TEACHER COMMENT NO. 7 : Small Group • Self-Evaluation

Instructions: Students are to list members of their group (with the exception of themselves) in the order of how valuable each was in accomplishing the group's goals. The ranking of members is collected and each group member's total score is determined by adding up the number he was ranked by each of his fellow group members. Each student's group rank is determined by listing them from the lowest total score to the highest total score. The member with the lowest total score is considered to be the most valuable.

Sample Form for Students

SMALL GROUP SELF-EVALUATION

Instructions: List group members in the order of how valuable each was in accomplishing the group's goals. Do not list your own name. For example if your group has six members, list five names in the order of their importance to your group's success. By each name indicate the grade you think each member deserves and make any comments about their work that you wish. This individual evaluation will remain confidential.

Rank Order of Members of the Group. (Names)	Letter Grade They Deserve	Comments
1.		
2.		
3.		
4.		
5.		

TEACHER COMMENT NO. 8 : Small Group • Flow of Contributions

Date_____

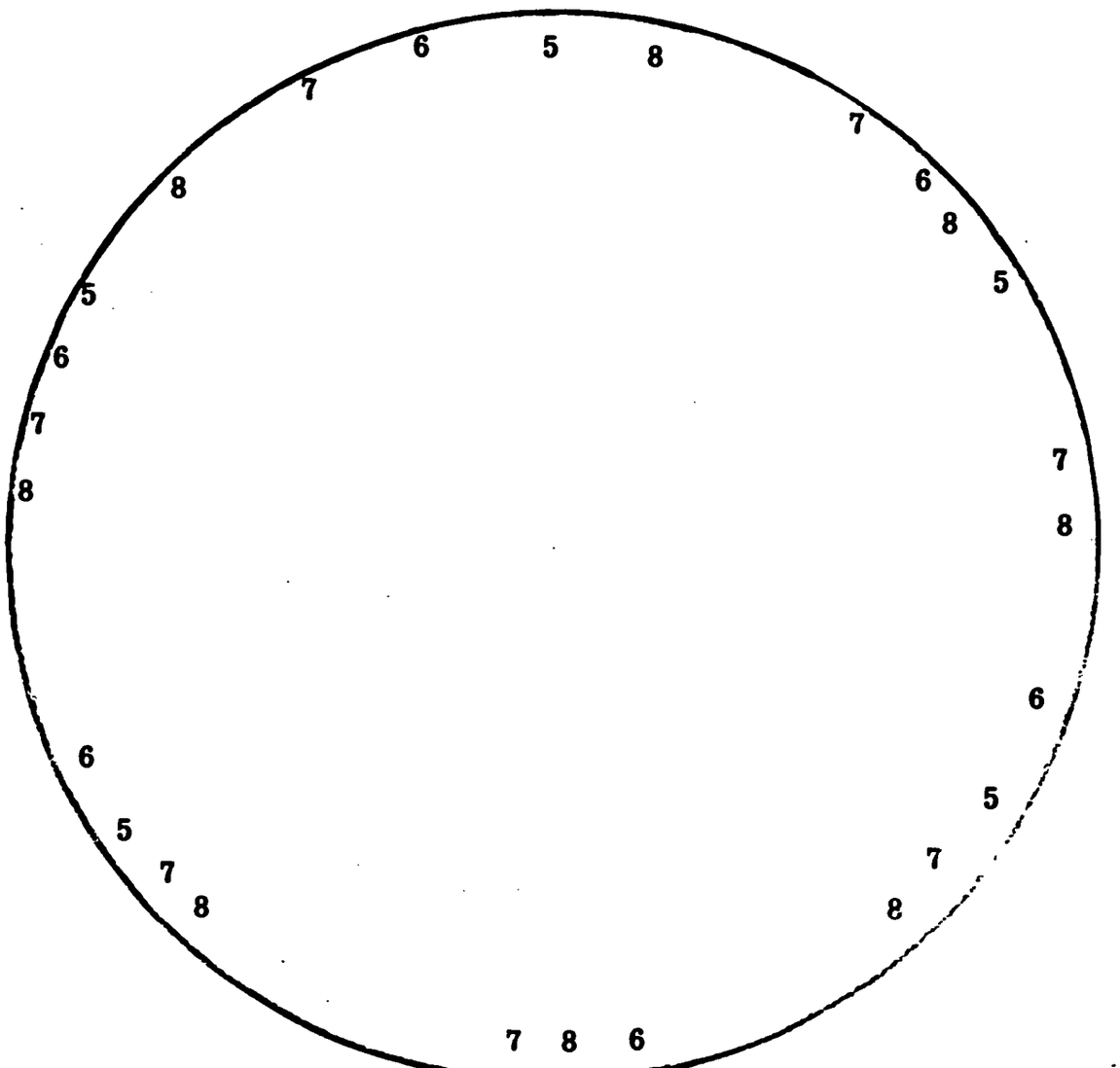
Time_____to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw a straight line from the first person who makes a contribution to each succeeding contributor as long as the discussion proceeds.

Evaluator_____



TEACHER COMMENT NO. 9 : Small Group • Pattern of Contributions

Date_____

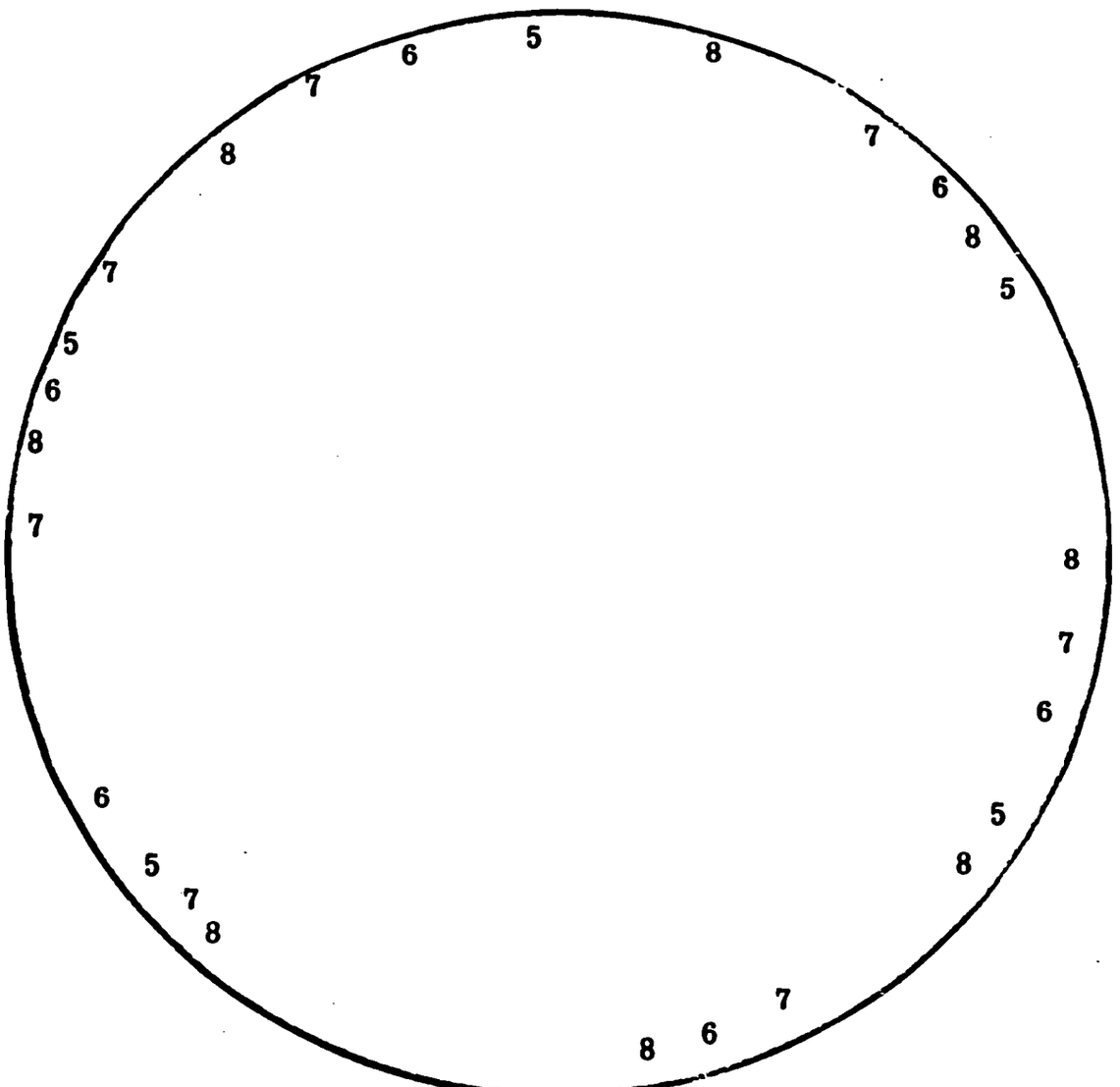
Time_____to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw an arrow (length of arrow in proportion to length of contribution) from the contributor toward the person to whom the contribution is directed. If the contribution is directed toward the entire group, direct the arrow toward the center of the circle.

Evaluator_____



TEACHER COMMENT NO. 10 : History Of The Ecological Crisis

Every creature interacts with its environment. Man is no exception. Throughout history, man has exerted a discernible effect upon his environment. Ecology is a relatively new name for a relationship which has existed since the beginning of time. Awareness of ecology has increased today, however, due to the ever-accelerating magnitude of man's influence on his environment -- mostly negative. In the essay "The Historical Roots of Our Ecologic Crisis," Lynn White, Jr. maintains that effective remediation of today's ecologic crisis depends upon adequate understanding of its history.

An excellent example of the ecological influence of one creature's activities upon the development of other species is afforded by the coral polyp. Following its own pattern of development, it has created an enormous undersea habitat for thousands of other species. While man may not be able to lay claim to a similar feat, he holds the dubious distinction of having compiled a long pedigree of distinctly adverse influences upon his environment. The legacy begins with an unproven, but highly plausible theory that early man helped exterminate the huge mammals of the Pleistocene Age and create the world's great grasslands by using a fire-drive method of hunting. And for six thousand years man has tamed the delta of the Nile River, preventing the natural development of a marshy African jungle. The construction of the Aswan Dam and consequent inundation of 5,000 square miles is only one more step in a process which spans the millennia.

Author Aldous Huxley, an avid conservationalist on the subject of ecology, "regaled" the author with an account of how he returned to a little valley in England which had been composed of pleasant grassy glades, only to find a wildly-overgrown stretch of unattractive brush. The cause? Man had deliberately introduced a disease, myxomatosis, to control the proliferation of rabbits -- a species which, he, in turn,

had introduced in 1176 to augment the protein diet of the peasantry. His misguided ecological intervention backfired when the rapid decline of the rabbit population allowed the weeds which they had fed upon to reproduce unchecked.

The pages of history are rife with examples of man's intrusions upon the balance of nature. Roman legions cut down entire forests to build ships for their naval struggle with Carthage. Land was despoiled by overgrazing, terracing or irrigation. The Crusaders hewed lumber to resolve logistical problems encountered on their expeditions. In France, the basic terrain today still reflects regional differences in agricultural methods practiced during the medieval period. Man's influence may be direct and intentional, as in the extinction of the European auroch (wild ox) in 1627, caused simply by indiscriminate hunting; or it may be indirect and virtually unforeseeable, as in the elimination of huge flocks of city sparrows which fed upon horse manure in city streets, due to the arrival of the automobile. Even the traditional battle of the Netherlands against the sea may have incurred negative ecological consequences. For centuries the Dutch have been pushing back the North Sea; the process is culminating this century with the reclamation of the Zuider Zee. The historical effect of man's intervention upon species of animals, birds, fish, shore life and plants in the area is not known.

Man continues to influence his environment today. The difference is his vastly increased capacity for despoiling his own habitat. When gunpowder was introduced to Europe in the 14th century, for instance, workers rushed to forests and mountains for potash, sulfur, iron ore and charcoal necessary to its manufacture, and some erosion and deforestation resulted. But these consequences were infinitesimal compared with the potential ecological influence of the hydrogen bomb, which would alter the genetics of all life on the planet. Smog dates back to London in 1825 when the use of soft coal as a fuel became widespread, but today's prodigious consumption of fossil fuels threatens to modify the basic chemistry of the earth's atmosphere, with consequences which defy prediction. Add to these the population explosion, with the bur-

geoning of sprawling "megalopoli," and attendant deposition of vast amounts of sewage and garbage in water and on land, and the crisis proportions of the environmental question today becomes apparent.

Growing awareness of the ecological crisis has prompted a "backlash," with solutions such as freezing the technology and returning to nature or extensive "beautification" campaigns popping up in many quarters. Author White discounts both such solutions, claiming that historical understanding must be the forerunner to effective counter-measures, lest man create further ecological backlashes with misguided remedial tactics.

The essential historical cause of today's ecological crisis was the marriage of pure science and empirical technology in the mid-19th century. Traditionally aristocratic and predominantly theoretical prior to this time, scientists eschewed the lower class, practically-oriented technological sector of society. Probably as a result of socio-political revolutions which began to break down class barriers there occurred a synthesis of "brain and hand," as theoretical science generated an allied field of applied science which translated conception into production via the technological process. Both modern science and modern technology are predominantly Western disciplines, both in style and method, although they have, of course, been disseminated across the globe in the 20th century.

The pre-eminence of the Occidental culture in science and technology dates back to the early Middle Ages. Building upon a foundation laid by the Islamic culture, Western Europe developed along technological lines while the Byzantine culture in the eastern Mediterranean flourished in aesthetic areas. Perhaps as early as 800 A.D. -- definitely no later than 1000 A.D. -- the West had applied water power to industrial processes other than the milling of grain. By the late 1100's wind power had been harnessed. By the early 14th century, two forms of the remarkable weight-driven clock had been developed. Western ships, arms, textiles and glass were infinitely superior to those developed in the East. It was their technological supremacy which enabled the territorially small western Eurpoean nations to achieve colonial domination

over the rest of the world. And it is the fusion of Western science and technology in the last 125 years which has contributed so significantly to man's increasing impact upon ecology.

"The Historical Roots of Our Ecological Crisis," White, Jr., L., Science, Vol 155, pp.1203-1207, 10 March 1967. Copyright 1967 by the American Association for the Advancement of Science.

82

TEACHER COMMENT NO. 11 : I Confess

The fact that something is wrong with the environment began to seep through my thick skull some 25 years ago - soon after World War II, when gas rationing ended and I resumed flying my own plane. I think I noticed the urban sprawl first and then the dirty air. Fliers used to say, "If you're ever lost, look for smoke. Where there's smoke, there's a city - and a field you can land on and ask where you are!" But by the middle 1950s this no longer held true. There was smoke - and something new called smog - almost everywhere, over country and city alike. Today it hangs like a pall most of the time over the entire nation, and even out over the sea.

There were other changes, too. I used to race an "S" class sloop on the sparkling waters of Long Island Sound every weekend. On fine days we'd get a good start in a brisk northwest breeze, but this would almost invariably poop out by midafternoon. Still, we would always count on the "evening southerly" to spring up about five o'clock and give us a thrilling beat back to the finish line off Larchmont, N.Y. This was due to the green earth's cooling off in the late afternoon and the consequent advection of the warmer air from the ocean, whose temperature remains comparatively constant. Over the years, however, the evening southerly became less and less reliable, and our boats were frequently becalmed.

Now I'm the kind of guy who always needs to know why and wherefore. So I went looking, and from a borrowed seaplane one dead-calm Sunday I discovered that the late-afternoon breeze still blows farther east, down the Sound - but not in the western waters, off Hempstead and Sands Point, where the land is covered with concrete and asphalt. These highways, airports, factories and houses, I figure, absorb the heat of the sun and retain it. Not until long after sunset does the concrete eventually cool, and then the southerly blows.

Meanwhile, the quality of the water had also changed. From those same factories and power plants and dwellings every day, millions of gallons of industrial and human wastes are poured out, eventually into the Sound. It's bad enough sailing briskly through this crud but, when you find yourself becalmed in it on a hot afternoon, that's all, folks! I resigned from the Larchmont Yacht Club and shipped my boat down to Florida in the early '60s, then gave her to the University of Miami a year later when I observed Biscayne Bay going the same polluted route.

Farmer's Follies. The rape of the good earth has struck me where I live, too. I bought a farm 25 years ago in the beautiful, unspoiled Blue Ridge Mountain country of Virginia. That is, I thought the land was unspoiled.

Disillusionment set in the first year. The grand old farm manager I inherited with the place worked it on shares as he had for previous owners. "Ever' sprang" he plowed those lovely, rolling hills and planted corn, in the long straight rows so it would be easier to cultivate and to pick. Still, the harvest was always poor; we were lucky to get 25 bushels of corn to the acre.

Driving home one day during a heavy rain, I observed seas of mud being washed down off the plowed hillsides of other farms onto the highway. At home, I donned foul-weather gear and rode a horse out across the fields. My worst fears were confirmed: the swollen creeks draining my own farm were torrents of reddish, soupy mud. No wonder little grew on the hillsides! The topsoil, with all the expensive chemical fertilizers we had put on it, was being flushed down those straight corn rows to the streams, the creeks, to the Potomac River. And this process had been going on for half a century or more!

I decided then that perhaps the greatest contribution a man can make is to leave the piece of ground which has nurtured him in better shape than it was when he took over. Since that day, I have not allowed a plow to touch my hillsides. The bald spots left by erosion we covered with hay and straw and spreader-loads of manure from the stables. Each year a first crop of hay is harvested; then later we clip the fields

again and "let it lay." The result has been the greenest hillsides in the area even in times of late-summer drought - and there are no more bald spots. The streams run clean and sparkling.

But one cannot fatten steers on grass, so about 15 years ago we went to a cow-calf operation -breeding purebred white-faced Herefords. And a new set of troubles began.

Every spring we lose apparently healthy cows. Suddenly, a week or two after calving, a cow begins to act strangely. She looks wildly around, weaves drunkenly, falls, and within seconds stiffens and expires. Sometimes, if one can get to her fast and inject a mixture of dextrose and minerals directly into the jugular vein, she'll stand up after a while and resume grazing as though nothing had happened.

Grass tetany, say the vets, caused by a mineral imbalance. But though we tried special feeding, and put mineral and salt blocks all over the place, the strange malady still strikes. In the spring of 1968, for example, we lost 27 cows.

Finally, on a hunch, we analyzed samples of water from a stream which drained a pasture. Sure enough - arsenic! It is probably the residue of small quantities spilled or left forgotten during spraying operations when that pasture was an orchard half a century ago! Every spring when the snow melts and the heavy rains come, traces of the arsenic - which is persistent, practically non-biodegradable - are washed into the stream. (We have found the arsenic in the grass, too, and in the livers of the dead cows.) Now, in addition to the intravenous dextrose and minerals, we give a stricken cow a shot of arsenic antidote as well. And last spring we lost only three cows.

How many more decades will have to pass before nature can rid our fields of that arsenic? And how about the DDT and other hydrocarbons used by people we hired to spray our garden fruit trees before I learned better only four years ago? We use no chemical fertilizers or persistent pesticides of any kind now. We use pyrethrins instead, and friendly insects and lots of birds. The fruit isn't as free of blemishes as it used to be when we sprayed with DDT, but I swear it's tastier, and we're no longer afraid to eat it

without washing it. We poison nothing anymore.

What Makes Earth Different. In Genesis 1:28, God said: "Be fruitful and multiply and replenish the earth, and subdue it." The Judeo-Christian world heard every word except one. "Subdue it" came in loud and clear, and so did "multiply." But practically nobody heard the word "replenish."

When our forebears came to this land, massive trees marched from Maine to the Dakotas. There were fragrant cedar swamps, miles of fir, pine, oak, chestnut, elm and hickory. Lewis and Clark reportedly saw them rising "like masts along the shores of a thousand crystalline lakes." Now, most of those forests are gone and the crystalline lakes are open cesspools. Man subdued and took dominion all right.

In addition to being beautiful, trees are a vital part of the ecosphere - the very thin, fragile interface of sea, land and atmosphere which is what makes earth differ from other planets. When the land is scalped at the headwaters of our rivers, the humus in the soil is eventually destroyed and water is no longer held in gradually seeping storage. Then flash flooding results in devastating soil erosion, as California learned in 1964. And thus do green forests become bleak deserts. Famed ecologist Paul Ehrlich stated recently that the deserts and wastelands of the world have increased from 10 per cent of the total land area to 25 per cent in the past century alone.

Stuff in the Water. What about water pollution? Well, for starters we have killed Lake Erie, Lake Michigan is sick with a gray tide of pollution. All of America's 22 major rivers are running sewers carrying our wastes and poisons to the seas. Millions of fish have perished in the Mississippi (to name just one) because its tributaries drain 32 states that have been saturated with such persistent pesticides as DDT, endrin and dieldrin.

In addition, phosphates overfertilize these rivers, lakes and streams, causing excessive algal bloom and eutrophication, or aging. Ironically, household detergents have become the "whipping boys" for

this. It's true that laundry products are responsible for about 60 percent of the phosphates in municipal sewage; human body wastes furnish the rest. But in non-urban, agricultural areas - a greater part of the country-more than 70 percent of the phosphates come from the farms, washed out by rains and irrigation. In either case, the pollution may be considerable. (You may have noticed that I don't sell a certain laundry product anymore. It's still a good detergent, but like its competitors it is in some degree a pollutant. And I can't sell a product for which I have to spend time in a 30-second commercial apologizing for its shortcomings.)

Of course, we have long believed that the seas possess limitless capacity to cleanse themselves. Wrong! Dead wrong. In fact, the seas are fast approaching their limits of pollution. Because of winds, currents and tides, toxic pesticides are now found in penguins and seals in both the Arctic and Antarctic. No one ever did any spraying there!

Quality of Life. All the pollution in our once-beautiful land has been produced by only 200 million Americans. At our present rate of population increase, there will be 300 million Americans 30 years from now (with seven billion persons on the entire planet). And those 300 million Americans will be hungry, too. We have less than 450 million acres of arable, usable soil upon which to raise food, and we're losing about a million acres of that per year to highways, airports and urban sprawl. At this rate, we will be left by 1995 with just 1.4 acres per person upon which to raise a year's supply of food. And that will be a problem!

Since millions of people already are going hungry, it seems obvious to me that the world passed its optimum population figure - perhaps as early as 1830, when the first billion mark was reached. And yes, we've got an optimum population figure for America, too, if we're going to maintain any quality of life. I'm old enough to remember vividly when we had only 100 million: what a paradise this was!

What can be done? Well, first, we who vote must learn the facts. Some of our politicians and leaders of industry shrug off books like Paul Ehrlich's Population Bomb or Barry Commoner's Science &

Survival as "just too far out." They fly across the country, see all that empty-looking land stretching below them, and they cannot believe there isn't enough room for ten times our present population and then some. They forget that less than 450 million of those acres can be used to raise food - and the "emptiness" only means that 85 percent of our people are living in the cities. As ingenious as our technologists have become, they cannot manufacture one grain of soil or one drop of water or one cubic inch of fresh air. Man -especially urban man - actually contributes nothing to the environment but pollution.

So, read the books I have mentioned, plus others like Robert and Leona Reinow's Moment in the Sun, Wesley Marx's The Frail Ocean and Aldo Leopold's A Sand County Almanac. Digest them. Encourage others to read them. Then when you vote, vote carefully - and make sure that your candidate knows at least as much as you do. Raise hell with him if he cops out.

Make every effort not to pollute or litter. Try to recycle resources that you use. Don't waste. And remember: Nothing will work unless we cut the population down.

If such restrictions are hard to understand, consider this: The population of the world is now 3.6 billion and doubling every 30 years or so. Forgetting other considerations, that means 7.2 billion by the year 2000; 14.4 billion by 2030; 28.8 billion by 2060, 57.6 billion by 2090. And that means no breathing room for anyone, even in America.

Man is now an endangered species. And nobody can save him but himself.

---

by Arthur Godfrey, "Confessions of a Polluter," The Reader's Digest.

TEACHER COMMENT NO. 12 : Wrecking The Landscape

The high dirt banks along some of Brevard's roads and the sand dunes in many of our wilderness areas have taken on a different appearance during the past year or so from the natural look that had existed for hundreds of years. Many of them are now defaced with ruts and have badly eroded crests.

This is not a natural erosion caused by water or wind. It is a man-made erosion caused by the recent popularity of the "sport" of dune buggies and other "off-the-road" type of vehicles, including some motorcycle riders.

These sand dune riders get their kicks from the wild ride and challenge of their motorized sport. It is not their intent to injure the land and destroy the beauty of the countryside for others. But this is nevertheless an unfortunate byproduct of their sport.

We generally take a liberal attitude toward any activity that is enjoyed by its practioners as long as it doesn't harm or endanger other members of society.

Although the dune buggie may not offer a direct threat to the health or safety of the public, it does seem a threat to the general welfare in some abstract ways. For the few minutes of pleasure it affords a dune buggy pilot, it leaves an enduring scar on the land that cheats others of the natural beauty of nature. And there may also be some more concrete objections--at least in some beach areas.

"There's no question that they do cause environmental damage," says Rep. A.H. "Gus" Craig, D-St. Augustine, chairman of the House Natural Resources Committee, "As time goes on and you keep getting more of them (dune buggies, etc.) you're going to have to find some place to put these people. I don't think you can do away with them. You have to realize that they're here to stay, but you have to keep it from getting completely out of hand," he said.

Craig's committee will be holding hearings soon on a couple of bills designed to protect the peace and integrity of the great outdoors. One is a bill by Rep. Bill Fulford, D-Orlando, to regulate air boats, and the other is a bill by Rep. Don Tucker, D-Tallahassee, to ban dune buggies from most beaches.

State Recreation and Parks Director Ney Landrim says the problem of dune buggies "is bad enough so that we're trying to take some steps to get it under control."

We agree that some limits and controls should be placed on the indiscriminate use of off-the-road vehicles before our state suffers very much more needless destruction. Restrictions were placed on half-tracks and other swamp rigs in game management areas not long ago. These should be expanded and extended to cover other damaging vehicles and lands outside game management areas.

Perhaps there could be some specified areas around the state where this type of activity could be allowed.

We hate to see more and more restrictions placed on the public, but the thoughtless abuse by some dune buggy drivers makes such action seem necessary.

Editorial, Today Newspaper, January 2, 1972

TEACHER COMMENT NO. 13 : Technology And The Environmental Crisis

Science and technology are basic to the American way of life. Despite the environmental problems they have caused, they are essential to the economy. Any viable solution to the problem of pollution must therefore work within our technological system, not against it. Edgar M. Cortright, director of the NASA Langely Research Center in Hampton, Va., has outlined a means of adapting our technology to preserve the environment without undermining the national economy.

Since technology is the basic cause for our environmental crisis today, technology must also provide the cure. Cortright first points out several positive aspects of science and technology: the energizing of the world by tapping fossil fuels and unlocking the energy of the atomic nucleus; rapid and far-reaching advances in transportation and communication, and great strides in medicine and biology, including the potential for mastering the genetic code. However, the last decade has witnessed increasing awareness of the serious problems which have accompained such technological advances: the destructive pollution which results from the combustion of fossil fuels; the unwelcome dissemination of agricultural chemicals, and the befouling of our waterways with sewage from mushrooming urban centers. Moreover, the finite capacity of the oceans and skies for absorbing industrial and municipal waste materials is a relatively new concept, but one essential to our survival. A continuing population explosion threatens the world's ecological balance. And in addition to the ecological crisis resulting from rapid technological expansion, man has cornered himself in a nuclear "balance of terror" ill-befitting the intellect which harnessed the atom. The urgency of the technological problems in the world today is underscored by a realization that the progress which caused them is constantly accelerating. Unless scientific solutions keep pace, man will be responsible for his own destruction.

Should we slow down our technology? A large segment of the population appears to think so, judging from certain indicators which suggest a growing public antagonism toward technology. Cortright points out several such indicators: the reluctance of political leaders to undertake new technical programs; increasing assaults on technological areas which are for the time being, at least-- viable; burgeoning unemployment among scientists and engineers; serious setbacks in the aerospace industry; decreasing student interest in science and technology, and diminishing financial support for technical colleges and universities. Claiming that this trend could lead to a national disaster, the author goes on to delineate alternative solutions. He calls for the technological community to win back the support of the public by voluntarily addressing itself to the solution of the diverse problems technology has helped cause. Cortright lumps these problems into categories he calls "superproblems"--i.e., mammoth problems which represent the integration of a multitude of lesser problems overlapping many scientific and technological disciplines. Environmental control is one such "superproblem," encompassing pollution, power, transportation and the economy. Cortright asserts that scientists and engineers must take the initiative in solving superproblems by furnishing local, state and federal governments with ideas, technical analyses and support -- WITHOUT compensation and encouragement, if necessary -- in order to assure due consideration to science and technology in the legislative planning of the nation's long-term development.

Our technology is essential not only to attack the superproblems of our society, but to sustain the economy. Cortright sees the influx of cheaply-manufactured foreign goods as a major threat to our balance of trade, one which can be offset only by continued American technological advances. Since American industry cannot compete with lower-priced foreign labor, it must compensate by exporting highly-advanced products such as computers and aircraft.

Another reason for maintaining our technological development is the reality of vicious international

competition, both commercial and military. Cortright brands those who would revert to a "simpler way of life" as daydreamers. He answers the proposition that more money be diverted from research and development to current domestic problems by pointing out that nearly 50 percent of our present national budget is allocated to domestic programs, as compared to approximately seven percent for research and development.

Maintaining a pre-eminent position in science and technology, then, is crucial to the future of the United States. Cortright says this can be achieved only by applying our scientists and engineers to the tough new superproblems of our society. In solving them, scientists will inevitably discover practical applications which are ancillary to the original objective, thus continuing to improve the standard of living. In the past, research aimed primarily at the development of weapons has yielded as "by-products" tremendous advances in air transportation, nuclear energy and electronics. Non-military alternatives are scientific fields such as biophysics and the life sciences, ultrahigh energy physics, plasma physics and controlled fusion, in addition to applied field in transportation, power, oceanography and space. Cortright also declares that the scientific and technical problems of preserving the environment are so complex as to necessitate new breakthroughs rather than merely applying existing technology.

In conclusion, Cortright states that the role of science and technology in the future of man can be either destructive or constructive, depending on whether man serves them, or enlists them in the service of human needs. A critical self-scrutiny will be essential to assure a favorable outcome.

TEACHER COMMENT NO. 14 : Is Survival Enough?

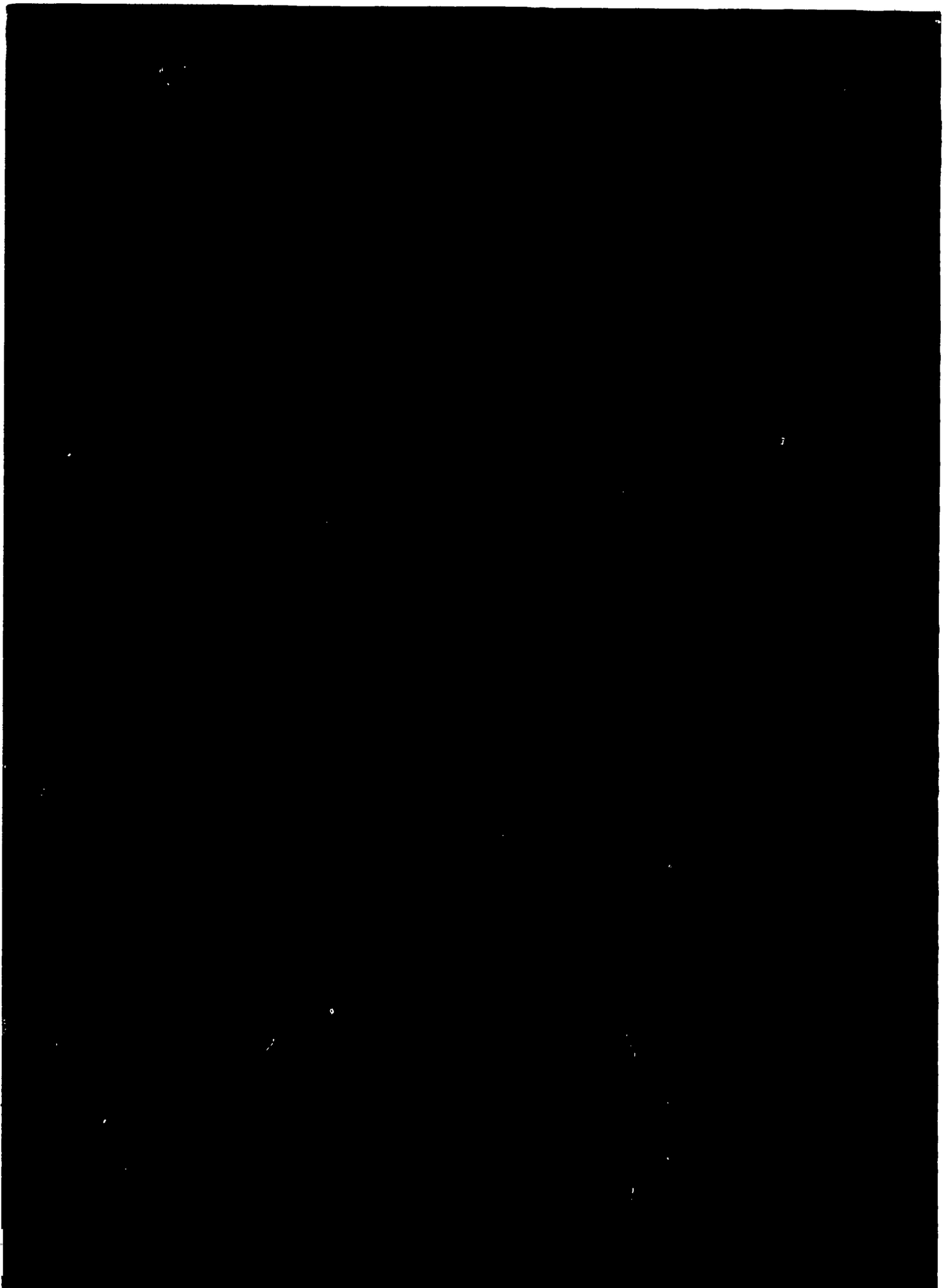
Will man pollute himself into extinction? Probably not, claims Rene Dubos in his article "Mere Survival is not Enough for Man" (Life, July 24, 1970), but the resultant situation could be much worse. Instead of succumbing to the pollutants his technology has spewed forth into the environment, man is more likely to adapt to them. Such an eventuality is worse than extinction, Dubos asserts, because it would lead to a sub-human type existence which violates man's natural heritage.

Man, like wild animals which adapt to confinement in zoos but lose their physical and behavioral magnificence, may learn to survive in a worldwide extension of the dirt, pollution and noise of a New York City or Tokyo, but it will be at the expense of his humanness. Man's very adaptability may pose a grave threat to the quality of life on this planet. The worst effects of pollution are just now becoming evident. For the first time an entire generation has been exposed to high levels of certain chemical pollutants, from the cradle up. Reaction, possibly adaptation, is inevitable.

Tangible hazards such as air, water and food pollution are not the only threats to a healthful environment, however. Man's humanness depends ultimately on an interplay with his environment which is tied to the origins of life and is part of a continuing creative process. Genetically, man is essentially the same as his Paleolithic ancestor who moved at liberty through nature in a open, active and largely self-supportive existence. He made most of his decisions upon immediate necessity, as an individual, his survival often hanging in the balance. Today man has been programmed into increasingly compartmentalized social niches which have systematically chipped away at the biological freedom enjoyed by his ancestors -- a freedom which, Dubos asserts, is essential to both biological and mental health. Man's basic social responses, his reaction to crowding and to strangers, his sense of social order and his forms of conflict,

are derived from the same primordial habitat from which he evolved. Therefore, today's technologically advanced society must give due consideration to man's Stone Age ancestry if human psychology is to be preserved along its present evolutionary path.

Concern for the destruction of man's physical environment, albeit essential, should not obscure the importance of maintaining a viable creative dimension to life. A degree of freedom must be an integral component of man's social organization if he is to flourish. Man can adapt to survive in a prison of pollutants erected by his own technology, but survival is not enough. Man must apply his creativity as a participant in a continuous regeneration of nature, rather than as a conqueror of nature who must ultimately conform to the parameters of the new artificial world he creates. To forsake his natural heritage is to relinquish his very humanity.



INQUIRY QUESTIONS

Inquiry Question:
I. WHAT DOES NATURE PROVIDE FOR MAN?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1: A. VIEW Observe pictures around the classroom	A. VIEW Pictures of various products or product areas which are developed from nature—foods, clothing, medicine, lumber, water fountain, etc.	A. VIEW	A. VIEW 1. Collect these pictures in advance and make a bulletin board or display. 2. This activity is to make the student aware that all we have (air, water, land, life itself) is a product of nature.
B. DISCUSS/LIST 1. Ask the class "what products or areas of product are provided to man through or by nature?" 2. Ask the class "what products or areas of product does man have which were not provided in some way through or by nature?" 3. Have either the teacher or student develop the list of items on the board as they are mentioned.	B. DISCUSS/LIST	B. DISCUSS/LIST Teacher Comment (TC) # 2, page 158	B. DISCUSS/LIST 1. This question should result in the ultimate realization that no such product or area exists. 2. Note: Activity # 4 can act as an alternative to Activity # 1. 3. Teacher Comment (TC) # 10, page 166.
Activity # 2: A. RESEARCH 1. Have students select a product or area of products which is provided by nature. 2. Assign each student a report (written and/or oral) to explain how the products (or area) is developed	A. RESEARCH Library or research center --the available material will vary with local facilities. If possible, these materials should be	A. RESEARCH Teacher Comment (TC) # 3, page 159	A. RESEARCH 1. Teacher Comment (TC) # 18, page 185 .What intangibles does nature provide for man? 2. These reports may be assigned individually or to

Inquiry Question: I. WHAT DOES NATURE PROVIDE FOR MAN?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
for man's use and what (if any) changes take place in nature because of this.	reserved for class use prior to beginning research. (This is particularly important for situations where several classes are participating in the same activity at one time.)		pairs of students. Some teachers will wish to have all reports given orally, others may wish to select those for oral presentation. 3. If several students are working in the same area, a panel discussion type of presentation may be useful.
Activity # 3:			
A. MAKE A VISUAL Assign the making of a collage to depict the great variety of areas of our human life styles where the impact of nature is felt.	A. MAKE A VISUAL Old magazines, newspapers, pictures, scissors, paste, construction paper, felt tip markers, colored pencils.	A. MAKE A VISUAL TC # 1, page 157	A. MAKE A VISUAL This may be an in-class activity or a homework activity. It may be useful as an extra-credit exercise. Check later activities in this unit if it is desired to make all assignments of this type at the beginning of the unit.
Activity # 4:			
A. LIST Students will individually list all things that man possesses which are not provided by nature.	A. LIST	A. LIST Collect lists and evaluate.	A. LIST Silence should be maintained for 15 minutes while each student thinks about the question and lists his independent selections.

Inquiry Question: I. WHAT DOES NATURE PROVIDE FOR MAN?

Learning Activities	Resources	Evaluation	Teacher Suggestions
B. DISCUSS 1. Have class discussion of items listed to obtain class agreement with individual items listed. Final results placed on chalkboard. 2. General discussion to add to list from (A) above.	B. DISCUSS	B. DISCUSS TC # 2, page 158	B. DISCUSS
C. WRITE Using information obtained in the above sections, have students write a conclusion to the Inquiry Question.	C. WRITE	C. WRITE Collect and evaluate form and content of essays.	C. WRITE
D. REPORT/DISCUSS 1. Have students report to class their written conclusions. 2. Have class arrive at general conclusion to Inquiry Question.	D. REPORT/DISCUSS	D. REPORT/DISCUSS TC # 3, page 159	D. REPORT/DISCUSS
Activity # 5:			
A. READ/RESPOND 1. Place quotation on chalkboard. 2. Divide class into small groups and have each write out their reaction to the quotation.	A. READ/RESPOND "No culture can remain long in an area if it uses its natural resources in such a way as to destroy its resource base." -James Davis, The Wide World.	A. READ/RESPOND TC # 4, page 160	A. READ/RESPOND TC # 9, page 165

Inquiry Question:

I. WHAT DOES NATURE PROVIDE FOR MAN?

Learning Activities	Resources	Evaluation	Teacher Suggestions
B. REPORT/DISCUSS 1. Each group presents their reaction to the class. 2. Class discusses reports and arrives at best interpretation of the quote.	B. REPORT/DISCUSS	B. REPORT/DISCUSS 1. TC # 3, page 159 2. TC # ?, page 158	B. REPORT/DISCUSS
C. VIEW/WRITE 1. Show a film or filmstrip which describes the effects that a natural resource has on social development. 2. Have students identify (in written form) the resource portrayed and how it affected social development.	C. VIEW/WRITE Typical films from the Brevard Film Library -- --Planters of Colonial Virginia. (4-25) --The Plantation South. (8-161)	C. VIEW/WRITE Evaluate written work for content.	C. VIEW/WRITE More appropriate films may be utilized if they can be obtained.
D. DISCUSS Hold a class discussion on Inquiry Question.	D. DISCUSS	D. DISCUSS TC # 2, page 158	D. DISCUSS

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1:			
A. REVIEW/WRITE 1. Have students scan materials for the concept --balance of nature. 2. Have each student write a short statement (approximately one paragraph) defining as best they can --balance of nature.	A. REVIEW/WRITE Dictionaries, encyclopedias, other available books, pamphlets magazine articles on ecology.	A. REVEIW/WRITE The written definition may be evaluated on the basis of its content.	A. REVEIW/WRITE TC # 19, page 186
B. READ/DISCUSS 1. Have several of the definitions read aloud until it is apparent that no-one else has additional material to contribute. 2. Develop (either by teacher or student led discussion) a general definition for "balance of nature."	B. READ/DISCUSS	B. READ/DISCUSS 1. TC # 2, page 158 2. If tests are used the definition may appear in a variety of ways for recall or comprehension evaluation.	B. READ/DISCUSS The definition arrived at should include (among many others) the following ideas and concepts: water cycle; oxygen-carbon dioxide cycle; natural animal population control.
Activity # 2:			
A. READ Employ SC #'s 1, 2, 3, as springboards to student research.	A. READ SC #'s 1, 2, 3, pages 123-129	A. READ Have students make written comments on articles. Are they able to answer the Inquiry Questions?	A. READ Copies should be made for student comments.
B. RESEARCH Have students conduct research to find examples of conclusions to subsections of the Inquiry Question.	B. RESEARCH Readers Guide to Periodical Literature Newspapers, refer-	B. RESEARCH Have each student write conclusions to the A, B, and/or C	B. RESEARCH

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
	ence books, vertical file.	subsections.	
C. REPORT/DISCUSS 1. Have students report research findings to class. 2. Class discusses reports and readings. 3. Class draws conclusions to Inquiry Question.	C. REPORT/DISCUSS	C. REPORT/DISCUSS TC # 2, page 158	C. REPORT/DISCUSS Award participation points or grade for each student's efforts.
Activity # 3:			
A. VIEW CARTOON/DISCUSS 1. Place cartoon (SC # 4) on overhead or opaque projector. 2. Students comment on cartoon.	A. VIEW CARTOON/DISCUSS 1. SC # 4, page 126 2. Overhead or opaque projector.	A. VIEW CARTOON/DISCUSS TC # 2, page 158	A. VIEW CARTOON/DISCUSS
B. DRAW Each student makes a cartoon depicting Inquiry Question # II.	B. DRAW Construction paper, (various colors) colored pencils, magic markers.	B. DRAW TC # 1, page 157	B. DRAW
C. DISPLAY 1. Display or show each of the students cartoons on the opaque projector. 2. Students make comments on other students cartoons.	C. DISPLAY	C. DISPLAY	C. DISPLAY

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 4:			
A. MAKE A CHART 1. Have each student prepare a pictorial chart depicting the dependence of one living animal on animals, the vegetation, land and climatic conditions. 2. Students will place man on his chart in the position he would occupy within nature's cycle so as not to disrupt it (if possible).	A. MAKE A CHART	A. MAKE A CHART TC # 1. page 157	A. MAKE A CHART Chart and list may be displayed in class for preview.
B. MAKE A LIST Each student will list the various ways man infringes on the cycle he has drawn.	B. MAKE A LIST	B. MAKE A LIST Collect and evaluate list.	B. MAKE A LIST
C. RESEARCH Each student will select from the list, one example of how man has harmed the balance of nature and write a report.	C. RESEARCH	C. RESEARCH Collect written reports.	C. RESEARCH
D. REPORT/DISCUSS 1. Each student reports to class. 2. Class discusses each report and arrives at general conclusion to Inquiry Question.	D. REPORT/DISCUSS	D. REPORT/DISCUSS 1. TC # 3, page 159 2. TC # 2, page 158	D. REPORT/DISCUSS

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 5: A. VIEW Show class filmstrip concerning man's threat to the balance of nature.	A. VIEW 1. Crisis of the Environment (SFS) Part II - "Breaking the Biological Strand." 2. This filmstrip pictures dangers of DDT nitrogen fertilizer, nuclear power and dam building. Both benefits and hazards presented. 3. Brevard teachers may borrow this filmstrip from the C.E.E.. Book in advance.	A. VIEW	A. VIEW You may wish to purchase this series for your school. To do so contact the following: Richter McBride Productions Inc., 250 West 57th Street, New York, New York 1001
B. LIST 1. Divide class into small groups. 2. Have each group discuss and list the following factors involved in man's disturbance of nature: -economic needs -social needs -psychological effects of these needs.	B. LIST	B. LIST 1. TC #'s 4, 5, 6, and/or 7, pages 160-163 2. Groups list could be collected and evaluated.	B. LIST

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
C. REPORT/DISCUSS 1. Each group reports it's list to class. 2. Class discusses lists and arrives at general conclusion to the Inquiry Question. Activity # 6:	C. REPORT/DISCUSS	C. REPORT/DISCUSS 1. TC # 3, page 159 2. TC # 2, page 158	C. REPORT/DISCUSS
A. READ Have each student read, "How Man Affects the World" (SC # 5).	A. READ SC # 5, page 127	A. READ	A. READ
B. LIST After reading the article, have each student develop a list of ways in which man has been harmful to nature.	B. LIST	B. LIST List can be collected and evaluated.	B. LIST
C. DISCUSS Discuss the following topics: a. the great number of ways man has harmed nature. b. the consequences of these harmful activities, i.e. loss of petroleum products (oil, gas, plastics, etc.), loss of land, forests, water supplies marine life, air quality, food supplies. c. the meaning of Richard Cauldet's statement that man should be renamed Homo	C. DISCUSS	C. DISCUSS 1. TC # 2, page 158 2. Each of these discussion topics may be used as the title of a written report or items for an essay exam.	C. DISCUSS

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Insapien - unthinking man.			
D. MAKE A VISUAL Assign the making of a collage to depict the damage which is done to nature by man.	D. MAKE A VISUAL Old magazines, newspapers, pictures, paste, scissors, construction paper, felt tip markers, colored pencils.	D. MAKE A VISUAL TC # 1, page 157	D. MAKE A VISUAL This may be an in-class activity or a homework activity.
Activity # 7:			
A. VIEW Show class a filmstrip about man's protection of wildlife.	A. VIEW 1. Crisis of the Environment, Part III - "Vanishing Species." 2. This filmstrip concerns wildlife and the threats of extinctions and preventions. 3. Can be borrowed from C.E.E.	A. VIEW	A. VIEW Any similar film or filmstrip would be appropriate.
B. DISCUSS Have class discuss filmstrip and how it presents a partial answer to the Inquiry Question.	B. DISCUSS	B. DISCUSS TC # 2, page 158	B. DISCUSS

Inquiry Question:	II. WHAT IS MEANT BY THE BALANCE OF NATURE?		
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 8: A. RESEARCH 1. Each student will research the conservation activities of an individual, organization, or government project, similar to the following: Theodore Roosevelt J.J. Audubon Audubon Society Izaak Walton League Sierra Club TVA Everglades Sequoia National Forest Endangered Species Protection 2. Student will prepare either a written report or a pictorial display of his research.	A. RESEARCH 1. School or local public library. 2. Write organization for required information.	A. RESEARCH Collect written and pictorial research and evaluate. TC # 1, page 157	A. RESEARCH Students could arrange interviews with local representative of various groups.
B. REPORT Student will deliver to class an oral report on his written or pictorial research.	B. REPORT	B. REPORT TC # 3, page 159	B. REPORT
C. DISCUSS Class discusses information obtained from reports to reach a conclusion to the Inquiry Question. Activity # 9:	C. DISCUSS	C. DISCUSS TC # 2, page 158	C. DISCUSS

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
A. RESEARCH 1. Divide class into research teams. 2. Each team selects a nation where natural resources are in short supply (i.e. Japan, Israel). 3. Locate information that demonstrates how and where used, but limited, resources of that nation can be improved. (Examples may include - fish hatcheries and use of small acreage for high yield without soil destruction.)	A. RESEARCH 1. School and local libraries can provide information. 2. Letters to each country's embassy located in this nation may reveal additional material.	A. RESEARCH If written research is required, collect and evaluate.	A. RESEARCH TC # 11, page 169
B. REPORT Each team reports its findings to the class.	B. REPORT	B. REPORT TC # 3, page 159	B. REPORT
C. DISCUSS Class discusses information from the reports and comes to a conclusion for the Inquiry Question.	C. DISCUSS	C. DISCUSS TC # 2, page 158	C. DISCUSS
Activity # 10:			
A. MAKE A PERIODICAL 1. Collect newspaper articles, cartoons, maps, and photographs to create a classroom periodical entitled, "Our City (or region) and Its Nature." 2. Divide class into groups, which would be responsible for one of	A. MAKE A PERIODICAL Local newspapers, periodicals, maps, photographs.	A. MAKE A PERIODICAL Collect each team's compilation and evaluate.	A. MAKE A PERIODICAL 1. Take at least one week for this assignment. 2. Use old as well as current newspapers. 3. Encourage students with camera's to document their assignment in pictures.

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
these sections of the periodical: topography weather base resources city growth population transportation.			4. TC # 12, page 170
B. PRESENT Have each group present their compilation to class in an oral report.	B. PRESENT The opaque projector may be of benefit for presentations.	B. PRESENT TC # 3, page 159	B. PRESENT
C. LIST/DISCUSS 1. After all the reports, have each student list ways man has affected nature locally. 2. As a class, arrive at a generalization to the Inquiry Question.	C. LIST/DISCUSS	C. LIST/DISCUSS Collect and evaluate.	C. LIST/DISCUSS
Activity # 11:			
A. INVITE A SPEAKER 1. Invite a representative of a local conservation group or appropriate government agency to class to be interviewed by students. 2. Have students compose questions before speaker arrives. 3. Hold a "Meet the Press" type presentation when speaker arrives. 4. In addition to the prepared	A. INVITE A SPEAKER Some suggested groups include the following: Audubon Society Izaak Walton League Sierra Club Conservation 70's Aspire Merritt Island Wildlife Refuge	A. INVITE A SPEAKER 1. Collect and evaluate a copy of student composed questions. 2. TC # 2, page 158 , for spontaneous questions from class.	A. INVITE A SPEAKER 1. If speaker wishes, supply him with student prepared questions before his arrival. 2. Have class select four students to participate in the "Meet the Press" presentation.

Inquiry Question:	II. WHAT IS MEANT BY THE BALANCE OF NATURE?		
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
questions, allow entire class to respond spontaneously to guest.			
B. DISCUSS After speaker leaves, have class discuss information presented and arrive at a generalization to the Inquiry Question.	B. DISCUSS	B. DISCUSS TC # 2, page 158	B. DISCUSS
Activity # 12:			
A. COLLECT 1. Each student will collect as many items/examples as possible of man's harmful infringement on the balance of nature. 2. Collection to be made in community and at home.	A. COLLECT Gather items which express a local example of how man infringes on nature.	A. COLLECT Each student given grade for quantity of examples provided (one minimum).	A. COLLECT
B. DISPLAY Students will prepare item/examples for display in class in the most effective and imaginative manner possible.	B. DISPLAY Supply whatever materials available to make display (tables, paper, colored pencils, etc).	B. DISPLAY	B. DISPLAY
C. JUDGE 1. Students efforts will be judged and awards given. 2. Have student committee construct the "Ecology Eyeball" awards.	C. JUDGE Arrange for a panel of impartial teachers and students.	C. JUDGE An "Ecology Eyeball" will be awarded for each of the following examples: - Most observant (wins Big Eye) - Most poignant	C. JUDGE 1. The "Ecology Eyeball" can be cut out of any white material. "Ecology green" can be used to border the eye and to make an eyeball of the ecology symbol.

Inquiry Question: II. WHAT IS MEANT BY THE BALANCE OF NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
		- Most frightening - Most unexpected - Most effective display (wins Pretty Eye) - Booby prize (poorest entry - wins Closed Eye).	2. Four "kinds of eyeballs" are necessary for awards. -regular size one -Big Eye should be twice as large as the regular -Pretty Eye -regular size with eyelashes attached -Closed Eye. 3. See TC # 22, for sample of "Ecology Eyeball" awards.

Inquiry Question:
III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1:			
A. VIEW FILM Have students view film related to Inquiry Question.	A. VIEW FILM 1. "Come to Florida Before It's Gone". 2. Rent from the following: Indiana University Audio-Visual Center Bloomington, Indiana	A. VIEW FILM	A. VIEW FILM 1. Encourage your school district to purchase this film. 2. Film produced by WJCT, Community Television, Inc., 2037 Main Street, Jacksonville, Florida, 32206.
B. DISCUSS/LIST 1. Class discusses information presented in the film and arrives at a general answer to Inquiry Question. 2. List answers on chalkboard.	B. DISCUSS/LIST	B. DISCUSS/LIST TC # 2, page 158	B. DISCUSS/LIST
Activity # 2:			
A. READ Have students read about salt as a de-icer for safety.	A. READ Read SC # 6, page 132	A. READ	A. READ Make copies for each student to read.
B. DISCUSS/LIST 1. Ask class to discuss the following: How does this article apply to the Inquiry Question? 2. List their remarks on chalkboard.	B. DISCUSS/LIST	B. DISCUSS/LIST TC # 2, page 158	B. DISCUSS/LIST

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
C. READ Have students read about coyote killing.	C. READ SC # 7, page 133	C. READ	C. READ Read over article first to see if it fits the maturity level of your students.
D. DISCUSS/LIST Ask class to comment on article and how it applies to Inquiry Question.	D. DISCUSS/LIST	D. DISCUSS/LIST TC # 2, page 158	D. DISCUSS/LIST
E. WRITE 1. Each student selects one of the two problems discussed. 2. Student writes out selected problem, tells what solution is most appropriate and why.	E. WRITE	E. WRITE Collect written essays and evaluate.	E. WRITE
Activity # 3:			
A. DISCUSS/WRITE 1. Divide class into small groups. 2. After reviewing supporting material, have each group write out a description of three responsibilities that are important in protecting individual rights in society which may at the same time conflict with nature. e.g. -right to life may conflict with nature through disease or famine.	A. DISCUSS/WRITE Have student review sections of government and history books which relate to individual rights.	A. DISCUSS/WRITE Collect and evaluate written descriptions.	A. DISCUSS/WRITE

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
B. PRESENT Have each group report their descriptions to the class, and allow class to question description.	B. PRESENT	B. PRESENT 1. TC # 2, page 159 2. TC # 3, page 164	B. PRESENT
C. DISCUSS/LIST Class discusses all reports and lists generalizations about Inquiry Question on chalkboard.	C. DISCUSS/LIST	C. DISCUSS/LIST TC # 2, page 158	C. DISCUSS/LIST
Activity # 4:			
A. READ/RESPOND 1. Have students read about man's rights. 2. Allow class to react to the short poem.	A. READ/RESPOND SC # 8, page 136	A. READ/RESPOND	A. READ/RESPOND 1. Suggested reading, Governing Nature, (chapter 5) by Earl Finbar Murphy 2. Poem could be reproduced for student reading or simply read to students. 3. TC # 14, page 179
B. VIEW FILMSTRIP Show filmstrip about man's rights.	B. VIEW FILMSTRIP 1. Crisis of the Environment, Part I- "Man: An Endangered Species". 2. Can be borrowed from C.E.E.	B. VIEW FILMSTRIP	B. VIEW FILMSTRIP
C. DISCUSS 1. After viewing filmstrip have	C. DISCUSS	C. DISCUSS TC # 2, page 158	C. DISCUSS

Inquiry Question:
III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
class discuss the following questions: -When there is conflict, which is more important, man's rights or his responsibility to nature. -How far should man go to control nature? 2. Record comments on chalkboard. Activity # 5:			
A. DISCUSS 1. Class discusses Inquiry Question. 2. Results are recorded on chalkboard and published for students.	A. DISCUSS	A. DISCUSS TC # 2, page 158	A. DISCUSS 1. Remarks recorded on chalkboard can be written or summarized by a student committee and reproduced on spirit duplicators. 2. TC # 20, page 188
B. DISCUSS/WRITE 1. Divide class into small groups. 2. Have each group discuss and write out conclusions to this topic: "What is man's responsibility to nature?"	B. DISCUSS/WRITE	B. DISCUSS/WRITE TC #'s 4, 5, 6 and/or 7, pages 160-163	B. DISCUSS/WRITE Teacher should make no attempt to influence student views or to obtain specific conclusions.
C. REPORT Each group presents their conclusions orally to the class.	C. REPORT	C. REPORT TC # 3, page 159	C. REPORT

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
D. DISCUSS Class discusses the various group reports and reaches a conclusion to the Inquiry Question.	D. DISCUSS	D. DISCUSS TC # 2, page 158	D. DISCUSS
E. WRITE Each student writes an essay giving an answer to the Inquiry Question based on discussion conclusions.	E. WRITE	E. WRITE Essay evaluation based on form and content.	E. WRITE
Activity # 6:			
A. READ Have the students read Student Comments and take notes on the content.	A. READ SC #'s 9 and 10, pages 137-138	A. READ	A. READ
B. PLAN A PANEL DISCUSSION 1. Divide class into small groups. 2. Using notes from the readings, have each group select a topic and plan one panel discussion. 3. Discussion topics focus on whether or not the following are essential for the survival of nature and the human rights of man: - Our social systems (institutions) must be restructured in order to save our natural resources. - To save man from self-	B. PLAN A PANEL DISCUSSION	B. PLAN A PANEL DISCUSSION TC #'s 4, 5, 6, and/or 7, pages 160-163	B. PLAN A PANEL DISCUSSION

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
destruction, our society must fully recognize nature's scheme of things. - There can be no compromise with nature. - Decentralization of all governments and implementation of full individual freedom will save nature. - Centralization of governments and implementation of severely restricted individual rights will save nature.			
C. HOLD A PANEL DISCUSSION 1. Allow groups adequate time at the beginning of class to present their discussion. 2. Allow class to question panel at close of presentation and to make generalization regarding the Inquiry Question.	C. HOLD A PANEL DISCUSSION	C. HOLD A PANEL DISCUSSION 1. Modify TC # 3, page 159 to evaluate panel participants. 2. TC # 2, page 158	C. HOLD A PANEL DISCUSSION
Activity # 7: A. LIST 1. List these issues on the chalkboard: - which is more important - the individual or society? - what we should do or what we want to do?	A. LIST	A. LIST TC # 2, page 158	A. LIST TC # 13, page 175

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
- life or happiness? - honesty or convenience? - expediency or justice? - comfort or necessity? 2. Ask students to choose one issue and be ready to defend the side in which they believe.			
B. HOLD A "MOCK CONVENTION" 1. Students elect a board of directors or convention chairman. 2. Adherents to the various sides of the issues "caucus" and plan arguments for their view. 3. Adherents "campaign" for acceptance of their viewpoint by other "caucuses". 4. Each caucus states their viewpoint in a final presentation to the general "convention". 5. General "convention" (entire class) votes on each issue.	B. HOLD A "MOCK CONVENTION"	B. HOLD A "MOCK CONVENTION" 1. TC #'s 4, 5, 6, and /or 7, pages 160-163 2. TC # 3, page 159	B. HOLD A "MOCK CONVENTION"
C. SUMMARIZE Have class attempt a conclusion to the Inquiry Question.	C. SUMMARIZE	C. SUMMARIZE TC # 2, page 158	C. SUMMARIZE
Activity # 8:			
A. RESEARCH/DISCUSS 1. Divide the class into two groups.	A. RESEARCH/ DISCUSS Library research materials.	A. RESEARCH/ DISCUSS 1. TC #'s 4, 5, 6, and 7, pages	A. RESEARCH/DISCUSS Teacher should serve as moderator or select a reliable

Inquiry Question: III. IN WHAT WAYS DO MAN'S INDIVIDUAL RIGHTS CONFLICT WITH NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
a. Group one will be given the question, "How can we adapt biologically to our environment?" b. Group two will be given the question, "How can we adapt to our environment culturally?" 2. The two groups will present findings or theories separately. 3. Two groups will then try to combine findings (biological and cultural). 4. List and discuss insoluble differences between groups reports.		160-163. 2. TC # 2, page 158	student to perform this function.

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1:			
A. DISCUSS 1. Divide class into small groups. 2. Each group will discuss and write a conclusion to the Inquiry Question.	A. DISCUSS	A. DISCUSS 1. TC #'s 4, 5, 6, and/or 7, pages 160-163. 2. Collect and evaluate written conclusions.	A. DISCUSS TC # 21, page 190
B. REPORT Each group reports their conclusion to the class.	B. REPORT	B. REPORT TC # 3, page 159	B. REPORT
C. DISCUSS 1. Allow class to react to each report. 2. Encourage class to decide on a composite of the reports.	C. DISCUSS	C. DISCUSS TC # 2, page 158	C. DISCUSS
Activity # 2:			
A. COLLECT Collect newspaper and magazine articles which relate to the Inquiry Question.	A. COLLECT Newspapers and magazines brought in by students.	A. COLLECT Evidence of articles brought.	A. COLLECT Bring in clippings that would pertain to the Inquiry Question.
B. READ Read newspapers and magazine articles brought to class and be able to summarize them.	B. READ See SC #'s 11-21, pages 139-150, for additional materials that could be read by students.	B. READ Evaluate quality of articles brought to class.	B. READ TC # 16, page 182

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
C. REPORT 1. Have students plan a panel discussion. 2. Have volunteers take the responsibility for speaking on the Inquiry sub-questions. 3. One student should preside as chairman and summarize each panel members reports.	C. REPORT	C. REPORT TC # 3, page 159	C. REPORT 1. Cassette tape for background material: "The Escape Hatch" (what science can and cannot do to rehabilitate our environment). Can be borrowed from C.E.E. 2. Additional background material: "Our Ecological Crisis," National Geographic, December, 1970.
Activity # 3:			
A. REPORT 1. Divide students into small groups - one group for each report topic: air - water - land (vegetation, population, etc.) 2. Each group will prepare a written report on their topic by including the following: a. the present state of endangerment of each b. what life would be like without the topic of their report.	A. REPORT 1. Use home, public and school libraries. 2. National Wildlife (1970-1972) magazine will be helpful in this report.	A. REPORT Collect and evaluate written reports on content and form.	A. REPORT 1. When necessary teacher should gather a variety of materials and bring to the classroom. 2. TC #'s 14 and 15, pages 179-181
B. DISCUSS Have class discuss the contents of their reports without making a formal presentation to class.	B. DISCUSS	B. DISCUSS	B. DISCUSS

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
C. WRITE Have each student respond to the Inquiry Question in essay form.	C. WRITE	C. WRITE Collect and evaluate written essay for content.	C. WRITE
Activity # 4:			
A. READ Have students read articles about environmental organizations.	A. READ 1. SC #'s 23,24, pages 152-153 2. News articles about local organizations if available.	A. READ	A. READ 1. Collect local articles well in advance of this activity. 2. Other useful material include pamphlets or statements from local industries or organizations regarding their efforts to solve environmental problems. 3. Guest speakers from local industries could explain why they feel responsible to act on environmental issues.
B. WRITE Have each student prepare a written suggestion for a type of local group that could be formed to work on environmental problems.	B. WRITE	B. WRITE Evaluate written suggestions for depth of thought, thoroughness and practicality.	B. WRITE
C. PRESENT/DISCUSS 1. Have students present their suggestion for a group to the class. 2. In class discussion, have students defend their suggestion on	C. PRESENT/DISCUSS	C. PRESENT/DISCUSS TC #'s 2 and 3, pages 158-159	C. PRESENT/DISCUSS

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
the basis of responsibility of man to improve the area recommended. Activity # 5: A. RESEARCH 1. Each student will provide the class with one example of a current plan or attempt to correct man's abuse of nature. 2. Examples to be taken from one of these areas: air - water - land. B. REPORT Each student will orally defend the plan or activity he has provided against attacks from the class. (Note: students should use current arguments in use by society to attack various programs.) C. CHOOSE After section B is completed, students will select one program in each area which seems to show the most promise for correcting man's abuse of nature. D. DISCUSS Class will discuss these questions: - what improvements could be made to these selected programs?	A. RESEARCH Home, public, and school libraries. B. REPORT C. CHOOSE D. DISCUSS	A. RESEARCH Evaluate quality of example provided. B. REPORT TC # 3, page 159 C. CHOOSE D. DISCUSS	A. RESEARCH B. REPORT C. CHOOSE D. DISCUSS

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
- what problems may arise from implementing these programs? - what does man's hesitancy to implement these programs tell us about his attitude toward correcting his misuse of nature? Activity # 6: A. CREATE 1. To demonstrate their opinion, outlook or feelings on sub-question D of the Inquiry Question, have students prepare one of the following: - a skit - an original poem - an original song - original speech - original piece of art 2. Students may work individually or in groups. B. PRESENT Students present to class their work of originality.	A. CREATE B. PRESENT	A. CREATE Collect and evaluate "works" on preparation and content. B. PRESENT TC # 3, page 159 (where it is appropriate).	A. CREATE 1. Teacher should provide students with a classroom period to freely move about and discuss with others in an informal planning session. During this period teacher should be available to offer suggestions, but not interfere otherwise. 2. At least 2 days, (but no more than 4 days) should be allowed for planning before presentation. (Enthusiasm usually wanes if planning is allowed to continue beyond this point.) B. PRESENT

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?

Learning Activities	Resources	Evaluation	Teacher Suggestions
C. DISCUSS Have class come to a conclusion to the Inquiry Question. Activity # 7 A. LIST 1. Place five basic concepts on the chalkboard. 2. Allow each student to select one concept.	C. DISCUSS A. LIST Five suggested basic concepts: a. Nature as the vast immutable. b. Nature finite-man infinite. c. Man as a part of the natural world to be diminished by the destruction of a fellow creature. d. Natural beauty no less vital part of our heritage than man-made beauty. e. Each species is irreplaceable and may contain substance or knowledge that could someday be essential to human survival.	C. DISCUSS TC # 2, page 158 A. LIST	C. DISCUSS A. LIST TC # 17, page 183

Inquiry Question: IV. WHAT IS MAN'S RESPONSIBILITY TO NATURE?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
B. WRITE/DISCUSS 1. Have each student write an essay on the basic concept he has chosen. 2. Without making a formal presentation to class, hold a discussion of each concept.	B. WRITE/DISCUSS	B. WRITE/DISCUSS Evaluate on basis of content.	B. WRITE/DISCUSS

STUDENT COMMENTS

Pollution Spreads Over Florida

By NIXON SMILEY
Herald Staff Writer

We are told that the federal government is reluctant to pay the major cost of cleaning up green, decaying Lake Apopka.

Florida would put up $250,000 of an estimated cost of one and three-fourths million dollars, provided the federal government's Environmental Protection Agency (EPA) would put up the rest.

Well, if I were a member of EPA I, too, would be reluctant to put up taxpayers' money. I'd want first to be shown what Florida is doing to protect its other lakes, rivers and waterways from the kind of pollution that Apopka has suffered. And, in particular, I'd want to be assured that pollutants from the towns along Apopka's shore, from muck farms and packing plants, from groves and cattle pastures, and from fish camps would be stopped.

Traveling over the state as I do, I've had the painful experience of seeing Florida's environment decline at an alarming rate during the past decade. This decline didn't occur just within a 10-year period; it has been in progress for a century, but was accelerated after World War II by developments, and finally caught up with us in the last decade.

WHEN MOST people talk of pollution in Florida they are likely to associate it with the influx of new people, together with new housing developments. But the new people have been only a part of the cause.

Farm, ranch and grove developments may have contributed as much or more to the degradation of our water than people have done. In order to obtain quick drainage of fields, ranches and groves, drainage ditches have been cut throughout much of Florida, and particularly in the marshy areas. Even the cypress, pop-ash and blackgum ponds have been ditched. Powerful pumps are installed to hasten the removal of water.

The result is that pollutants — nitrogen, phosphate, insecticides, acids — are rushed to lakes and streams. These are added to septic tank effluent, or, as with the St. Johns River and some of the larger lakes, to sewage dumped directly.

FLORIDA'S sickest major river is the St. Johns. This once picturesque stream, with its countless numbers of wildlife and fish, is today virtually a cesspool; in the dry season virtually a stagnant series of lakes and ponds.

The only reason the St. Johns isn't as green as Lake Apopka is because it is flushed out, to some extent, by annual runoff and by tidal flow in a portion of its lower part.

The marshes and swamps from which the St. Johns formerly obtained enough water at all times of the year to keep it flowing have been so thoroughly drained that the river now receives a glut of water in the wet season and hardly any water during the dry season.

WHEREVER I GO in Florida I see no efforts being made to halt the kind of drainage that is ruining our lakes and streams; I see only continuing works that are sure to do more damage. Such drainage is associated with new highways, with improved pastures, groves, farms, housing developments, factories, shopping centers, amusement centers.

More of our waterways are being covered by green scum. The native vegetation is disappearing from lakes, to be replaced by algae. The bass and bream and perch that you used to catch with a flyrod or cane pole are vanishing. Fishing is becoming a chore rather than a pleasure.

But many streams and lakes are so dead there's nothing left in them to break the surface; not even water insects that are normal to such streams.

I DRIVE frequently on south Red Road alongside Snapper Creek. It's always a dismaying experience. The canal is covered, or partly covered, by green algae or duckweed. But what is worse, there's never the slightest sign of life in the water. No feeding or cavorting bass or bream ever breaks the surface.

From time to time you see a wood duck or a coot swimming with considerable effort among the gunk, the beer cans, the trash.

Is this the way Florida's going? Like Lake Apopka? Like the St. Johns?

I see little evidence that much is being done to change the course of disaster.

STUDENT COMMENT NO. 2

Oddly enough, wild animals prefer man's way of running a forest.

Most people probably think a wild forest is teeming with life. While a harvested one is sterile and lifeless. Just the opposite is true

In a mature, wild forest, the trees have all grown to about the same height. Their luxuriant crowns interlock and form a dense canopy. And almost completely cut off the sun's rays

So the forest floor is dark and almost completely devoid of small plant life. There's no brush, no seedlings, no saplings. And therefore, few wild animals. Because this new growth is what feeds and shelters the whole spectrum of animal life. From deer to deer mice.

But managed forests, like the 8 million acres of trees St. Regis takes care of, are truly teeming with life.

Within a few months after we harvest an area—and in New Hampshire, for instance, we usually leave 40% to 60% of the trees—new growth starts.

And then, as soon as there's enough food and shelter, the animal population begins to increase. First, the tiny eaters of seeds and insects. Then the browsers, like deer and moose. Finally, the predators.

We're not suggesting that all forests should be harvested. Far from it. We all benefit in some way from the preservation of wilderness. But we all benefit from managed forests, too. Man and animals.

In fact, we've found that man's needs don't have to be at odds with Nature's. As long as we follow a certain concept that St. Regis believes in:

Nature will cooperate with man, if man learns to cooperate with Nature. ST REGIS

131

STUDENT COMMENT NO. 3

Bay Marine Life's Restorable

Having spent my youth on and in Biscayne Bay, I have seen a healthy body of water that once supported a fishing industry evolve into a cesspool almost void of marine life.

The change has been gradual, but it reflects the apathy of the people to their environment.

The restoration of marine life in our area is a simple matter of controlling silt and sewerage. Both contaminate the waters, depleting food supplies and breeding grounds of marine life.

Oxygen-starved sewerage discharges could be limited to a few canals, allowing the others to support marine life by access to saline mixtures of fresh water.

Deep-draft boats and commercial barges drag the bay bottom in a constant turmoil of water traffic. Mud becomes silt and is kept agitated by wind-wave actions. Channels could be dug and islands built, without cost to the public, that would prevent silt from drifting and provide navigable waters for proper use. Channels would also provide large areas of rock ledge needed for marine life survival.

C. GRADY MIXON

132

STUDENT COMMENT NO. 4

"Over the polluted river, and through litter-covered woods,
to Grandmother's smogged-in house we go . . . "

STUDENT COMMENT NO. 5 : How Man Affects the World

Ten thousand years ago it was the natural environment which ruled man, and not vice versa. He was a hunter and food-gatherer, a nomadic creature who lived directly off nature. The damage he inflicted upon his environment was local and minor, and, with time, was repaired by Nature. There are still isolated places in the world where man exists in almost perfect harmony with his habitat--an ice-bound corner of northwest Greenland, for example, where 250 Eskimos live precisely as their ancestors did centuries ago, totally dependent on the polar bear for food, clothing, and shelter. Similar enclaves exist in remote reaches of Africa, Asia, and South America. But by and large, the equilibrium of the essential ecological formula has been reversed--it is now man who dominates the environment.

Throughout the course of history, the effects of this domination have been much more negative than positive, and today the threat to the earth's environment by the activities of man has reached crisis proportions. The problem dates to 8000 B. C., with the beginning of the New Stone Age. The domestication of animals and the development of agriculture led to the formation of settlements. At first these settlements were temporary, their occupants moving on as soon as the domestic animals had overgrazed the lands and the soil of the fields had been exhausted by overcultivation. When man learned techniques of crop rotation, irrigation and manuring, however, his existence was stabilized. Permanent communities sprang up, usually in fertile regions such as river valleys, or coastal areas. It was from these communities that the vast congested population centers of the world today developed.

World population has increased like a snowball rolling down a hill. For centuries the movement was slight. As recently as 1600 A. D. much of the world was still uninhabited; the total world population was 500 million. Now the population snowball has built up momentum and is continuing to accelerate. The population of the world today is approximately 3. 5 billion and is increasing by 70 million a year, 200,000

a day, 8,000 every hour. The United Nations has predicted that the world population will double by the year 2000. Within 70 years, the population of the world may reach 15 billion. This would cause dense habitation of all areas of the world except for the polar ice caps, the most impenetrable jungles of Africa and South America, and the world's harshest desert regions.

Population alone, however, is not the sole cause of the ecological crisis. Man's expanding technologies have cut even deeper into his environment. The process dates back to the discovery of fire, which initiated the deforestation of the land to provide fuel. The discovery of bronze and iron required increased quantities of wood--and later coal--to fuel the smelting process. However, up until the last 200 years man's injuries to the environment were very slight compared to its magnitude. It was the Industrial Revolution of the late 18th and 19th centuries which accelerated man's demands for natural resources and raw materials to create power and products. Two thirds of the world's forest areas have either disappeared or been exploited beyond recognition. The earth itself was dissected--and still is--to tap the resources of coal, copper and other minerals. Some of these substances may be exhausted in the foreseeable future. The technological expansion of the 20th century has increased the rate of man's impact on the environment. Exploitation of petroleum resources has reached two billion tons annually. Tremendous increases in the demand for electric power has created an ever-growing need for coal and oil. Natural gas has also been tapped in the last few decades. However, the supply of nonrenewable fossile fuels may not be able to keep pace with the demands of industry; global industrial production has doubled between 1960 and 1969, and is expected to have increased five-fold by the year 2000. Nuclear power is being developed as an alternate energy source.

Industrialization has resulted in three major forms of environmental degradation. The first is the despoilage of land which results from extensive mining needed to furnish the raw materials for production. Some 250,000 acres of Britain are scarred by coal and oil shale waste heaps. In the United States,

opencase coal and copper mining, borax extraction, gold dredging and hydraulic mining of gold have laid waste more than three million acres.

The second problem is depletion and pollution of the world's water resources. The discharge of industrial effluents into the waterways of highly developed nations has reached incredible proportions. Many rivers are little better than open sewers. The Buffalo River in the United States has been classified a fire hazard. Man's destruction of his water resources is not limited to direct pollution, however. The draining of vast wetlands to create farmlands and accommodate a mushrooming population disrupts the ecological balance of these watersheds, and removes inland water resources at the very time when industrialization and urbanization are causing the need for water to increase.

Air pollution is the third serious environmental problem caused by industry, and by motor vehicles. Combustion of hydrocarbon fuels consumes precious oxygen and releases ever increasing quantities of carbon monoxide, sulfur oxides, nitrogen oxides and dust and ash particles into the atmosphere. Dr. La Mont Cole of Cornell University warns that the time may come when the world will run out of oxygen at night and during winter months when plants are not replenishing the oxygen supply; combustion of fuels, consuming oxygen and releasing carbon dioxide could exceed the rate of replacement by green plants. Other worried scientists suggest that if we continue to raise the carbon dioxide content of the atmosphere by burning coal, oil, and natural gas (it has gone up by 14 per cent over the past 100 years), the effect could be a warming of the earth's surface leading to a melting of the polar ice caps.

Man's scientific and technological resourcefulness may enable him to solve the crises of air and water pollution by devising purification methods which make it possible to completely recycle water resources and by harnessing new forms of power, such as nuclear energy and solar radiation, which do not cause air pollution. Even if pollution can be solved and new energy sources developed, however, land is inevitably going to run out if the population continues to grow at its present pace. This problem has been

compounded by a continuing urbanization trend which has resulted from industrialization in the past hundred years. A century ago, there were only a few cities with populations of two million or more. Now there are 50 cities of that size. Two out of five people in the world dwell in cities of 100,000 or more; 400 million people live in cities of one million or more. Cities of up to a billion inhabitants may develop in the next century.

The rush of people into urban centers has caused a dangerous decay of food-producing rural areas in some developing nations. Mechanized farming has offset this problem and maintained agricultural production in technologically advanced nations, but widespread use of chemical pesticides, an important part of these methods, creates a serious environmental hazard. There is also the danger of excessive deforestation and overexploitation of farmlands, of the sort which produced the Great Dust Bowl in the American Midwest during the 1920's and 1930's. In addition, largescale agricultural methods require wide open fields to accommodate enormous machines. This has resulted in the removal of hedgerows and thickets between fields in many areas, exposing soil to the wind erosion the hedgerows were designed to prevent. The reduction of woodlands areas also deprives much wildlife of its natural habitat. Such ecological disruption could ultimately be suicidal for man, who remains part of nature's balance even though he exerts such a strong influence upon the environment. Destruction of natural habitats is essentially a more subtle form of hunting, which has caused the extinction of more than 150 species of birds and animals, and endangered another 1,000 species. An example of the "backlash" which can accompany man's destruction of a natural habitat follows: Birds which feed on insect pests disappear when their habitat is sacrificed to expanding farmland. Man then resorts to chemical insecticides as surrogates for the birds' natural function. These, in turn, destroy not only the insects but the remaining bird life, and, through the complex food chain of Nature, possibly even poison man himself eventually.

Man's relationship with his environment is not entirely destructive. Man has the capability of

exercising constructive environmental control measures as well. His technology has made possible the construction of dams and reservoirs to conserve water resources; irrigation systems to transform deserts into fertile lands, as in Israel and western America; projects to reclaim land from the sea, as in Holland, and modification of the weather by seeding clouds with dry ice or silver iodide to bring rain to arid regions. However, these projects must be undertaken with due regard for their ecological consequences. For example, there are plans to install a mile-wide dam on the Congo River in Africa, which would create a huge Congo Sea. The Ubangi River, a tributary of the Congo, would then back up into Lake Chad and create an enormous Chad Sea, equal in area to the Baltic, White, Black and Caspian seas combined. These two seas, which would cover 10 per cent of the continent, could then be tapped to irrigate the Sahara Desert. Another monumental plan is the proposed construction of a 50-mile dam across the Bering Strait. This would increase the flow of warm Atlantic water by arresting the natural flow of Pacific water, warm the coastlines of countries bordering on the Pacific, and thus increase food production. Russia has even considered using nuclear energy to remove the Arctic ice pack, in order to warm the Baltic nations.* However, all three projects would inevitably have a substantial and irreversible impact on the ecological balance of large regions of the world, and as such must be carefully evaluated before being carried out.

Man has the technological ability to walk on the moon. Unless he soon devotes much of this ability to the preservation of the earth, he may find he has rendered it little more hospitable than the surface of the moon. In order to survive, man must achieve a complete awareness of his dual role towards nature. On the one hand, man is a major force influencing the environment--either positively or negatively. But he will always remain totally dependent on it for his survival. Learning that lesson is truly a life-and-death matter.

*This project could prove highly unpopular in Brevard County and other low-lying coastal areas!

STUDENT COMMENT NO. 6 : Of Salts and Safety

Almost every community in the northern U. S. uses de-icing salts to help clear snowbound roads. The use of salts is up 300% since 1960 (to 9,000,000 tons last year). Now these cheap and efficient de-icers have been identified as an annoying source of pollution in at least 13 states.

The major problem with the massive use of de-icing salts--in addition to the havoc they wreak on automobile underbodies--is that they damage roadside vegetation and, more important, seep into nearby water supplies. The salts not only give the water a brackish taste, but can be a genuine health hazard as well. In Massachusetts, 62 communities were warned by the state health department last year that their drinking water contained enough sodium to endanger the lives of people with heart or kidney ailments who were on strict low-salt diets. Tests in Minnesota disclosed that even the anticorrosive additives in the salts, designed to prevent auto rust, can do more harm than good: phosphates in the additives are nutrients that can speed eutrophication, the natural aging process of bodies of water. Some additives used to prevent the salts' caking contain compounds that decompose into poisonous cyanide ions.

In response to such complaints, some chemical companies are trying to figure out ways of taking the sting out of de-icers. Meanwhile, it is hard to argue with highway officials who insist that banning the de-icers would present an even greater hazard to public health and safety. As evidence they cite the example of Burlington, Mass., which last December decided to ban the use of salts on its roads after detecting high sodium levels in its drinking water. This winter the community's schools have been closed more often than those of neighboring towns because of icy roads, and minor auto accidents have increased notably.

STUDENT COMMENT NO. 7

Coyote Killing: Business as Usual

TUESDAY, DECEMBER 14, 1971 THE WALL STREET JOURNAL.

By KENNETH G. SLOCUM

COLEMAN, Texas — It's night in the Texas bush. Millions of glinting stars illuminate the countryside, delicately scented by dew on mesquite. A little creek chuckles over ledges of rock.

Abruptly, from a moonlit ridge comes the howl of a coyote, a lonesome, primitive call that seems to rise to the heavens and drift outward beyond the horizon.

And indeed it does. For this is sheep country, and the coyote is a predator—the leading character in a mounting environmental battle that stretches from the prairies and mountains of the West to Congress and the White House.

At issue is the half-century-old federally guided operation to thin out such predators as coyotes, bobcats and mountain lions—a program that sheep men consider essential but inadequate. It's being challenged by an impressive federation of environmental groups, which, if successful, would demolish the program's most lethal tools.

Hearings on predator control open today before the Senate subcommittee on agriculture, environmental and consumer protection headed by Gale McGee, the Wyoming Democrat. And a blue-ribbon panel of wildlife experts, commissioned last July by the Department of Interior and the Council on Environmental Quality, will announce its recommendations for improving the program in a few days.

Some old hands in the fray speak of a milestone in the making. "We're witnessing the breaking away from the frontier attitude," says Jack Berryman, director of Wildlife Services, the Interior Department unit that conducts most of the predator program in Western states. "No longer can we say that anytime a wolf or tree gets in our way we'll do away with it."

A milestone is possible, but not likely. As early as 1964 conservationists were warning that the widespread use of poisons and other chemicals by government trappers and independent stockmen was decimating not only the target animals but countless innocent ones—some of them dwindling members of endangered species.

The Leopold Report

The warning was issued in the so-called Leopold Report, named for A. Starker Leopold, professor of forestry and conservation at the University of California and head of another blue-ribbon panel of wildlife experts. The Leopold group was named by another Secretary of Interior, Stewart Udall, who also faced pressure from conservationists. The board of experts even included two who were named to the current one.

The Leopold Report, a highly regarded, oft-quoted document, noted that a sample year's control kill included 89,653 coyotes, 20,780 lynx and bobcat, 1,170 beaver, 6,941 badger and 7,615 opossum. The report also warned against the use of Compound 1080, a lethal, controversial chemical, for killing field rodents such as ground squirrels and prairie dogs. The chemical also was killing wildlife that fed on these rodents, including such disappearing species as the black-footed ferret and the California condor. (1080 is still used for field rodent control, according to Wildlife Services, which says, "We have nothing better.")

The wildlife board considered some aspects of the federal program ill-advised. In 18 national forests in California, the value of sheep lost to predators in one year was $3,501, but the amount spent to kill predators was $80,196.

The wildlife group concluded: "It is the unanimous opinion of the board that control as actually practiced today is considerably in excess of the amount that can be justified in terms of total public interest. As a consequence, many animals which have never offended private property owners or public resource values are being killed unnecessarily."

The result? Despite some changed responsibilities and shuffled paper, execution of the 1964 recommendations has been minimal. Mr. Leopold himself observes that "while we've gone a ways to meet recommendations, we didn't go far enough. In some parts of the country, the sheep industry dictates exactly

what will happen, regardless of what policy is in Washington. Nothing changes much in Utah, for instance."

Another architect of the report is even more blunt: "The report really didn't change anything—the same people are doing the same things with the same tools."

Stanley A. Cain, director of the Institute for Environmental Quality at the University of Michigan, was on the 1964 board and is chairman of the present one. Mr. Cain, who served as Assistant Secretary of Interior from 1965 to 1968, blames the failure on "the system."

"Federal money is only a fraction of the total, so to a large extent the rancher is paying for the predator control. And regardless of the theory, the man who pays the fiddler still calls the tune. Where it really falls down, however, is not the money but the inability to supervise."

Predator work is paid for by an $8 million kitty roughly 60% contributed by states, individual ranchers and livestock associations. The balance is federal money. (This, of course, is in addition to an untold amount of predator killing by ranchers themselves or trappers hired by them or stockmen's groups, all of whom have easy access to poisons.)

While Wildlife Services theoretically has authority over the some 700 trappers who do the actual control work, first allegiance is often to their rancher neighbors; supervision is scanty at best. In Texas, for instance, 70 state-paid trappers roaming over 267,339 square miles of countryside are supervised by eight federal men.

Nor is the federal system working in another aspect of the predator problem—control over predator killing by the public. In 1965 the government decided thallium sulphate was too dangerous for general use in predator control, and withdrew approval of interstate shipment to the public. The poison is so lethal and lasting that when poisoned baits are placed on the ground vegetation won't grow for more than two years. No antidote is known.

Although the poison's label states for manufacturing use only—not for sale to the general public," shipments totaling 65 pounds from the Denver plant of American Smelting & Refining Co. a few months ago found their way to Western ranchers who used it for predator control, according to Senate committee data. (A spokesman for American Smelting says the ranchers were "manufacturers of their own rodenticides.")

Apparently it was one of these shipments that resulted in the deaths of 21 golden and bald eagles in Jackson Canyon near Casper, Wyo., last spring. The only immediate result was that a sheep rancher was fined $674 after pleading "no contest" to charges of illegally shooting and utilizing antelope, which he had laced with thallium sulphate. And the Environmental Protection Agency suspended American Smelting's federal registration to ship the product interstate as a rodenticide.

Government supporters such as Raymond Trimble, of Eldorado, Texas, argue that such incidents dramatize what would happen under current law if the federal program were curtailed. Mr. Trimble, a government trapper, who at 39 holds a bachelor's degree in biology, has 10 years' experience and is paid $5,400 a year, comments, "I know of ranchers who grind up sheep into hamburger, load it with strychnine and then drive through their ranch slinging it out both sides of a pickup. My God, can you imagine what that does to wildlife?"

But the most blatant evidence of the present system's failure involves the recent widespread aerial shooting of eagles in an operation bankrolled by sheep ranchers. Killing eagles with poison or from aircraft has been a violation of federal law since 1963.

Mr. Vogan's Testimony

But a pilot, James Vogan, testifying before Sen. McGee's subcommittee in July, stated that under pay by sheep ranchers, he flew gunners on missions last fall that killed more than 500 eagles, including bald eagles, which are protected as an endangered species.

There was nothing secretive about the illegal killings, he maintained. The pilot said that even agents of the Wyoming Fish and Game commission were aware of it. "The Wyoming Fish and Game came out and saw these eagles piled up, we had a regular haystack of them out there when we first started bringing them in and, of course, there wasn't nothing ever done about it," Mr. Vogan testified.

(James White, head of the Wyoming Fish and Game Commission, says. "We investigated the officers who purportedly were involved and found no evidence they had knowledge of it. Besides, there was no state violation—the golden eagle is still classified as a predacious bird in Wyoming and our people wouldn't have any authority even had they known.")

Prosecution is still pending, the federal government says.

Sheep ranchers have their side of the argument, of course. Predators do kill livestock, which feed, clothe and educate the rancher's family. The annual sheep loss to predators, primarily from coyotes, amounts to $17 million, according to a government study. (Sheep, which one rancher observes "seem to try to commit suicide from the moment they're born," are by far the most common loss, although coyotes also savor ripe watermelons and flocks of geese used to weed cotton fields.)

And urban dwellers who express shock at any control measures by ranchers and trappers are often ignorant of prairie life. One Texas sheep rancher tells angrily of finding a dozen dead lambs in a single morning, their hearts and livers torn out by coyotes. A widow who ranches 13 square miles of Irion County, Texas, relates with satisfaction how she poisoned with strychnine the foxes that in a single night chewed off the lips of 18 newborn lambs. More typical of Texas, a Texas trapper states, is for them to seize a newborn lamb and eat out the tongue, leaving the animal alive but doomed.

The Sheep Men's Mood

Clearly, sheep men are in no mood to temper their attack on predators. Wade Hemphill, former president of a bank in Coleman, Texas, who pastures 6,400 acres, declares, "We've got the finest physical conditions in 20 years—grass, water and weather—but there won't be a sheep industry here much longer if we don't get more control over coyotes." Mr. Hemphill, who says he normally would market 1,600 lambs off his 2,000 ewes, has only 400. He blames both the loss of the lambs and 250 ewes that died in the last year on predators. He adds, "Normally I'm the best-na-

tured old boy around, but right now I'm using everything I can get my hands on to get those coyotes out of here."

Against this backdrop, the task force of wildlife experts will soon announce its recommendations. Although it hasn't hinted at its findings, it almost certainly will suggest tougher controls over poisons, particularly by the general public, as well as greater protection for eagles and disappearing species of animals. It also is likely to wrestle again with the possibility of a government-subsidized insurance for predator damage, similar to the existing but little-used crop damage insurance.

Unquestionably, it again will take a stand favoring less-severe destruction of predators. "A lot of people feel they have the right to get out and hear a coyote howl," observes the task force's Mr. Leopold. "We have written a report that will defend that right."

He and his highly qualified associates undoubtedly have. But if history is any guide, conservationists a decade from now will still be citing Mr. Leopold's current report as what should be done next.

Mr. Slocum is chief of The Journal's Dallas bureau.

142

STUDENT COMMENT NO. 8 : Mankind's Inalienable Rights

1. The right to eat well.
2. The right to drink pure water.
3. The right to breathe clean air.
4. The right to decent, uncrowded shelter.
5. The right to enjoy natural beauty.
6. The right to avoid regimentation.
7. The right to avoid pesticide poisoning.
8. The right to freedom from thermonuclear war.
9. The right to limit families.
10. The right to educate our children.
11. The right to have grandchildren.

-Paul R. Ehrlich

STUDENT COMMENT NO. 9: Technology

See Teacher Comments No. 4, Social Studies Unit One, Page 62.

144

STUDENT COMMENT NO. 10 : Effects Of Advanced Technology

See Teacher Comment No. 3, Social Studies Unit One, Page 61

145

STUDENT COMMENT NO. 11

Plan In Works To Save Rivers

By JOHN PENNEKAMP

FLORIDA'S Cabinet may take over today where Uncle Sam backed off under pressure several years ago.

The state may authorize a system of scenic and wild rivers.

Pennekamp

The purpose is to prevent them from despoliation, where they remain reasonably natural or unspoiled, and to make them recreationally useful.

Final decisions will be made after study. Thus far nine rivers have been selected and others may be added if they qualify, according to Randolph Hodges, executive director of the Department of Natural Resources.

SEVERAL years ago Uncle Sam set out to preserve a series of wild rivers throughout the United States. Several of them were in Florida, including the Suwannee and Oklawaha, scenically and historically among the foremost in the country.

Political pressure, exerted in behalf of a few camp site owners along the Suwannee, essentially eliminated that stream from the list, although there are indications that a rescue effort has not yet expired.

The Suwannee rises in the Okeefenokee Swamp in southeast Georgia, meanders through several counties in that state, then across several Florida counties to empty into the Gulf of Mexico r rth of Cedar Key.

In proposing it for preservation as a wild river the federal government planned to permit the camp owners to retain a lifetime interest in their holding after paying for the property, or to move them to adjoining land in a value-for-value swap. A few, with political clout, headed the resistance.

The land through which the river operates is relatively undeveloped.

ALSO on the federal list was the Oklawaha, declared by many to have been among the most beautiful in the world. It fell to the pressure of the cross-state canal enthusiasts, also a limited group centered in Ocala.

They impressed Uncle Sam with the argument that by using a portion — some 40 miles of the Oklawaha — money in building the canal, which has been projected more than 100 years, would be saved. Their argument prevailed despite the fact that opponents insisted that the benefit-to-cost estimated was questionable, as were the estimates of use and maintenance, and that, if the canal had to be built, another more feasible and less destructive route from the conservation standpoint was available. There is an existing canal through Lake Okeechobee from Stuart to Fort Myers.

When President Nixon stopped work on the newer canal only a portion of the Oklawaha remained, but the Rodman Dam, near Palatka, had created an enormous and appealing lake which is gaining attention as a recreational resource.

Were the dam to be removed, experts estimate that it would require up to 80 years for the river and its borders to restore themselves.

RECREATIONAL importance will be a prime consideration when the Cabinet considers the scenic and wild river proposal today. Only one is in South Florida, population growth and pollution apparently having eliminated the others.

"A scenic river," says Hodges, "is one with scenic or aesthetic qualities, having natural, free-flowing, unpolluted water. It may have occasional bridges, a few dwellings and even some commercial activity."

Wild rivers he defined as having essentially natural features, pristine water and a minimum of human development, with essentially natural conditions for vegetation and wildlife growth.

RECOMMENDED for study are:

Blackwater, which flows from the Alabama-Florida line to Blackwater Bay near Milton; Econfine Creek, which rises in the state's western highlands and flows to Deer Point Lake, a part of North Bay; Chipola, largest of those selected, flowing 85 miles from the Alabama-Florida line to the Apalachicola River.

Also the Wacissa, east of Tallahassee and flowing from its springhead to the Auchila; Ichetucknee near Fort White, Columbia County, flowing from its springhead to the Santa Fe; Wekiva, beginning near Apopka and flowing to the St. Johns.

Further south are the Econlockhatchee which begins near Orlando and flows into the St. Johns; Hillsborough, beginning north of Crystal Springs and flowing into Hillsborough Bay at Tampa. And the southernmost, Loxahatchee, in Palm Beach and Martin counties, which flows along the southern boundary of Jonathan Dickinson State Park into the Atlantic Ocean.

Oil Spills Are Blamed For Killing Birds Along the East Coast

Minor oil spills at sea may be killing hundreds of wild birds along Florida's East Coast, a state Game and Fresh Water Fish Commission biologist theorized Monday.

Speculation on the cause of the bird kills before has centered on the probability of pesticide poisoning.

Research biologist Lovett Williams, of the commission's Gainesville office, said the five University of Florida pathologists who've teamed to study the bird kills favor the oil spill theory because the majority of sick and dead birds found have been loons — diving fish-eaters particularly susceptible to petroleum poisoning. Other birds found, in lesser numbers, have been gannets, cormorants, and a few pelicans and ducks. They're all diving birds likely to pick up surface oil.

"YOU KNOW, a bird doesn't have to be coated with gunk to be killed by oil," Williams said. It's been estimated a spot the size of a quarter on their feathers will kill them because they eat it when they're preening themselves.

We don't even know yet how much or what kind of petroleum will kill them."

But so far there's nothing but theory to account for the deaths of "hundreds of birds" Williams said have been found from Cocoa Beach to Boynton Beach. He's holding six birds shipped for testing from the West Palm Beach area, but no tests have been started on them.

THE PATHOLOGISTS, headed by University of Florida's Dr. Don Forrester, have been holding out for a live specimen. Testing was scheduled to start today because a live, but sick, loon was found in Cocoa and is being shipped to Gainesville.

Major Louis Gainey, commission regional manager in West Palm Beach, said he thinks the birds are dying — at the rate of three and four a day — of pesticide poisoning. He also points out that all the dying birds are fish eaters, but for a different reason. He said the fish might be carrying pesticide residues.

Gainey, who's worked in this area for 22 years, said the kills have been about the same for the past three weeks, an "unusually long time for birds to be killed."

The thing that really concerns me is when a kill like this occurs over a long period of time and we don't know what's causing it."

Williams, however, said essentially the same thing had happened each winter for years, and only increased public concern for wild animals had instigated this year's investigation.

In 50 Feet of Water Off Homestead

Manned 'Tube' to Study Pollution

By RICHARD POTHIER
Herald Science Writer

Scientists in Miami put the finishing touches on America's first underwater mobile home Monday — making up beds and preparing equipment for Florida's most ambitious manned undersea research project.

Later this week, if all goes well, a 20-ton, three-man undersea laboratory will be dunked into 50 feet of water off Homestead to begin one of America's longest undersea explorations.

It's called Project FLARE — for Florida Aquanaut Research Expedition — and will also include later dives off Miami Beach and in John Pennekamp State Park.

SCIENTISTS FROM Florida and federal institutions believe FLARE should be able to carry out pioneering research on the effects of pollution on coral reefs, among other research areas.

The National Oceanic and Atmospheric Administration is coordinating the project, assisted by scientific teams from the University of Miami and other institutions.

FLARE will last for nearly three months and will involve up to 40 divers and support technicians, many of them aboard the laboratory's "mother ship" — the 100-foot Lulu, operated by the Woods Hole Oceanographic Laboratory.

THE LABORATORY itself is a 21-foot-long steel cylinder complete with bunks, a desk, laboratory bench, and crowded with electronic and scientific gear including a closed-circuit TV operation to keep the lab's occupants under constant study.

It's not exactly roomy — eight by 10 feet, inside. But it is equipped with a pair of comfortable foam-rubber bunks with spac for a third bunk on the floor. And the vie through a pair of portholes should make u for the lack of luxuries.

Teams of two or three undersea experts all trained divers, will be rotated aboard th lab. Each team, including a husband-and wife team from North Carolina, will spend three to five days in the lab.

THE AQUANAUTS will be able to swim out through a hatch in the structure and will carry out research on a variety of undersea questions ranging from water chemistry to the effects of artificial reefs (made from old tires) in attracting fish.

The FLARE aquanauts are headed by Dr. John G. VanDerwalker, a NOAA scientist who participated in the 1970 Tektite manned undersea laboratory project in the Virgin Islands.

STUDENT COMMENT NO. 14

New Harvester Eliminates Hyacinths

Orlando Sentinel
Sunday, Jan. 16, 1972

By NORMA HENDRICKS
Staff Writer

A harvester that took three years and $200,000 to build is munching 16 cubic yards of hyacinths in ten minutes in Panasoffkee Creek and spitting out the shreds into a truck for spreading in a pasture.

Duane Leach of Sarasota, who, with his son J. D. Leach Jr. and Fred Kinsell, built and operates the massive rig, says the work is interesting, because "almost everything we do is an experiment."

CLYDE HUNT, whose crew did a beautiful job of clearing Little Jones Creek, found his equipment wouldn't handle the solid, choking cover of hyacinths on Panasoffkee Creek, and asked the Sumter County Recreation and Water Control Authority to try the harvester.

"Eevrybody wants to do something about hyacinths without chemicals, but so far as we know, the Sumter County water board is the only one in the state that is really doing something constructive about it," said Duane Leach. And his son added,

"Officials everywhere are full of encouragement for our efforts, and little else. That is the reason why we are so happy to be with people who want to see somthing done. In our minds they deserve all kinds of credit for making the first move, and I feel that move will be felt all over the state."

THEY ALL agree that a few hyacinths are beneficial to any waterway. The trouble is that nobody ever has just a few hyacinths, or not for long.

Fred Kinsell, member of the harvesting team with the memory for statistics, said that hyacinths produce from both seed and runners to form other plants. One acre of hyacinths will produce 45 million seed, and five per cent will germinate for up to 10 years.

The seed comes from the bloom, and it takes only 38 hours from the time the capsule forms at the water to produce a bloom, reach down to touch the water and begin a new cycle.

TEN PLANTS, said Kinsell, in eight months will produce an acre of hyacinths. Something must be done, and chemical controls have dominated simply because that was all there was available

The Leach firm, Sarasota Weed & Feed, Inc., conducted an experiment at Punta Gorda at Shell Creek Reservoir, financed by the state, which says the cost-benefit ratio is higher than with chemical controls.

However, Leach pointed out that while it requires only three men to operate the harvester, there were 15 people doing the same work in the Shell Creek project, adding to the cost. Also, at the time the firm was using a commercial chopper, which was the best they could get then.

SINCE THEN, they have built their own chopper, which runs five times as fast and breaks down less often. And people living in the area of the experiment report that for the first time in six years, they can enjoy clean, white sand beaches unstained by the hyacinths and spray formerly polluting the water.

Experiments in use of the ground hyacinths are taking many angles: cattle feed, paper products, potting soil. So far, says the younger Leach, who studied agricultural economics as well as journalism at the University of Florida, the potting soil appears to be the most promising financially.

Jim Veal of the Sumter County Recreation and Water Control board, said the board has strong objections to chemical control in Sumter County's waterways, long famous for good fishing. The board is hopeful that the state agencies will cooperate in hyacinth removal tactics throughout the state.

"What price can you put on clean water?" Veal said. "Removal by harvesting will be a continuing process, but after the bulk of them are once removed, it will not be expensive to continue it."

STUDENT COMMENT NO. 15

Air Jets May Create Rain

By TOM SIEBERT
Associated Press Writer

DENVER — Rainmakers of the future will be able to shoot some of nature's less efficient clouds with supersonic jets of compressed air to create rain and snow, say Bureau of Reclamation scientists who are testing the technique.

The compressed air is funneled through tiny nozzles attached to the outside of a cloudseeding aircraft, and bursts into the atmosphere at speeds approaching 1,000 miles per hour. Expanding rapidly, it freezes little pockets of water vapor to nearly minus 70 degrees centigrade to produce microscopic ice embryos.

The embryos then attract the cloud's water to form ice crystals heavy enough to become precipitation.

The nozzle technique is less expensive, as well as more efficient and ecologically sound, than current cloud-seeding techniques using silver iodide and other chemical solutions, said Stanley Brown, a meteorologist at the bureau's Engineering and Research Center here.

The researchers also are studying the possibility of using it to seed the clouds of low-lying fog that sometimes force airports to close. Seeding the clouds would turn the mist into rain and snow to clear the air.

The ecological benefit would come from the reduced use of silver iodide, Brown said. Although the chemical is not currently considered a threat because only minute quantities return to earth from cloud-seeding programs some environmentalists are worried about the possibility of long-term silver iodide accumulations in a particular area.

Simple in concept and requiring only air as a raw material, the nozzle technique can provide enough ice crystals to seed a cloud in a matter of seconds.

One gram of compressed air, cooled to zero degrees centigrade and shot through a single pencil-thick, centimeter-long nozzle, will form over one trillion ice embryos in a second, Brown said.

One major use of the technique would be to seed orographic clouds, which are formed as moist air flows up the windward side of a mountain, he said. Ordinarily these clouds dissipate as they hit the downwind side of the mountain and the ice crystals, formed in the cold rarified air above the mountains, evaporate.

By shooting the clouds with ice embryos, heavier crystals are formed, in effect preserving the cloud's downwind side.

In winter, in clouds which contain a large amount of supercooled water droplets, the embryos will attract the cloud's water molecules to form ice crystals heavy enough so their sheer weight causes them to fall to the ground as rain or snow.

The technique also can be applied successfully to seeding summer cumulous the embryos will attract the clouds which float in widespread patterns across the sky and can't be seeded from the ground, said Brown.

These clouds sometimes do not grow large enough to produce rain because they can't produce enough heat to expand through upper layers of stable air. Producing millions of ice crystals in the top of the cloud causes it to release a large amount of heat, and this phenomenon makes the cloud more buoyant, causes it to grow larger, and enables it to process more water longer in order to produce rain.

150

STUDENT COMMENT NO. 16

Askew Asks Help to Solve Ecological, Job Problems

The Miami Herald
Sun., Feb. 6, 1972

By Herald Wire Services

Gov. Reubin Askew Saturday called on the Legislature, unions and conservationists to help solve some of the state's pressing problems — environmental controls, unemployment and unfair taxes.

At his first of two speaking engagements, Askew called on the Legislature to do something about migrant labor and the unemployed.

Saying 40 per cent of Florida's residents earn poverty-level incomes, he told the Florida State Building and Construction Trades Council in Orlando that it was time assistance was given to "the unemployed, the underemployed and the untrained."

SPEAKING Saturday night to the Florida Audubon Society convention at Winter Park, the governor urged conservationists to support his plan for a consolidated ecological "superagency" that would end "the impossible environmental bureaucracy of our state."

"When one agency is draining wetlands while another is trying to create them, it's time for a change," he said. "When one agency is trying to keep tide waters from being converted into fresh waters, and another is promoting that very thing, it's time for a change."

Askew's plan would create one agency for protecting the environment, a job now splintered among the Department of Natural Resources, Internal Improvement Fund trustees, Air and Water Pollution Control Department, Department of Agriculture, Game and Fresh Water Fish Commission and the health division of the Health and Rehabilitative Service Department.

Askew spelled out his need for the strong backing of conservationists behind his troubled proposal for a new Department of Environmental Affairs.

"The word is 'H-E-L-P'— help," Askew said, repeating the word five other times in his speech — each time after mentioning still another environmental problem he said the current system couldn't cope with.

The governor said Florida's environmental ills "might never be solved until we overhaul the various departments, parts of departments, bureaus, boards, commissions and agencies which make up the impossible environmental bureaucracy of our state."

IN ORLANDO, Askew said his proposal to increase unemployment compensation could mean maximum payments of $86 a month next year instead of $54, urging legislators to enact a formula to pay 50 per cent of the ex-employe's wage with a fixed ceiling equal to two-thirds of the statewide average. The present limit is $54.

"I also am asking the Legislature this year to begin to overcome the myth of the migrant worker," said Askew, "and to extend both unemployment compensation and workman's compensation to all farm workers in our state."

Askew said Florida ranks 47th in the nation in its unemployment compensation payments, which he said is "job insurance, not welfare."

"These aren't loafers," he said. "They're working, contributing Floridians who have fallen victim to an imperfect economy."

Askew said that labor unions which have been cast as economic villains on salary issues can change their image by working toward economic, political and envi- all Floridians.

"I believe there's only one way to put that kind of talk to rest — by providing the kind of vigorous and responsive action and positive leadership on all fronts which will restore the union's own image as champion of the underdog," he said.

The governor said unions should use their influence to change "any federal, state or local tax structure that discriminates against working people — and there are some, believe me."

He said they also should work for consumer protection legislation and lobby for environment bills.

IN WINTER Park, Askew said he had expected various environmental groups to support his plan and was surprised that several lobbyists for ecological causes have fought the proposal.

"How tragic it will be now if the true conservationists of our state are found to be paralyzed in disagreement, confusion and apathy at this, their moment of fulfillment in Florida," he added.

One such group, Conservation 70s, has declined to endorse the plan, but the reason is the Game and Fish Commission.

"There is a lot of sentiment that the game commission has performed an outstanding job," Loring Lovell, C-70s president has said. "The system has worked."

While C-70s, the influential lobbying arm of a coalition of conservation groups, has not voted to oppose the governor's proposal, Lovell has said the full bill isn't likely to gain the group's seal of approval unless the game commission is guaranteed some form of autonomy.

In an apparent reference to the game commission, Askew said, in his speech, "Whenever an agency's existence becomes more important than the problem it was designed to meet, it is time for a change."

Lovell does acknowledge that C-70, probably will support many aspects of the measure, like the land and water use portion.

Rep. Jim Reeves (D., Pensacola), chairman of the House Government Organization and Efficiency Committee, predicts the committee will pass the environmental bill Tuesday. House Speaker Richard Pettigrew's office said it probably will come up for House action by Friday.

STUDENT COMMENT NO. 17

Land-Use Planning A Must for Florida, House Chief Says

TALLAHASSEE (AP) —State land-use planning is a must if Florida is to stay out of the mess that Southern California is in, legislative leaders told a Florida Chamber of Commerce seminar Wednesday.

They gave high legislative priority to planning in a panel discussion that also emphasized the importance of education and environmental reorganization, abortion, welfare reform and reapportionment.

"Unless the state exercises a strong role in planning and leading growth, it's going to lead us into a situation involving the kind of mess Southern California finds itself in," said House Speaker Richard Pettigrew, D-Miami.

He said that much of Southern California's water supply is piped through huge tubes from mountain areas hundreds of miles away.

A land-use planning bill is under consideration in House committees.

It calls for splitting the state into 7 to 11 planning districts, with various local governments in these districts working together to lay out a half-dozen broad zoning classifications.

Examples would be industrial development, residential development, conservation and preservation.

"Not too far off, we could have that kind of problem in this state too," Pettigrew said, "It's foreseeable unless we act."

Senate President Jerry Thomas, D-Jupiter, also called for land-use planning but said: "It must be done in common use standards along such a way that it's not confiscatory to the land owner."

If population growth continues at present rates, as many people as now live in the six smallest states will pour into Florida in the next 10 years," Thomas said.

He emphasized the importance of education reform by saying "some change must take place because what's presently happening is not bringing about the results that should be expected."

Thomas said many Florida high school graduates "cannot compose a proper sentence and cannot even read."

Pettigrew compared the present education system to a "Rube Goldberg" contraption with the governor, Cabinet and education commissioner all working different controls.

Committees in both houses are studying a plan by Gov. Askew's Citizens Committee on Education to control the schools with a state board replacing the Cabinet and Board of Regents.

Legislators agreed that the Florida Supreme Court will strike down the abortion law and that will require passage of a new law.

But House Republican leader Don Reed, R-Boca Raton, said he was fairly confident abortion opponents had the power to keep the new law from being very liberal.

Reed said a 10 percent welfare increase sought by Askew would probably pass because "the mood of the people is to increase the benefits that government offers people."

However, Henderson said the increase will not have the blessing of the legislature if "we continue to have 20 to 25 percent of it going to the wrong people."

STUDENT COMMENT NO. 18

Pollution Data's Fishy, Vague

By JOHN PENNEKAMP

THERE has to be some way in which we can arrive at decisions in what seems to be an unending controversy in the matter of contamination.

Pennekamp

I make a distinction between pollution and contamination, thinking of pollution as the unconscionable introduction (dumping) of matter that is destructive of life into the various elements we use to remain alive.

Contamination, in the definition used here, is the degree to which matter may enter that same lifestream causing no evil. When it gets above that degree, of course, it becomes pollution.

So the question is: Why can't our scientists and experts come to agreement as to what these levels are?

THERE IS, for instance, disagreement about the safety level of mercury in seafood. The federal government fixes it as 0.5 parts per million.

That decision has knocked out the swordfish industry, which provided a considerable part of the economy in the northeastern United States. It threatens others.

So far as my personal tastes are concerned, I have no objection. Swordfish always struck me as among the driest and most vapid of foods. Maybe it wasn't prepared properly when it was placed before me, but I don't care if I never have another opportunity to eat it.

However, I know lots of folks who consider it among the more delectable of seafoods, and I don't believe they should be deprived of it if that 0.5 limitation is faulty.

SOME time ago I wrote on this subject and was rewarded with considerable mail, some of it from scientists, who saw that limitation as almost capricious. One said a 2.0 parts per million content would not be dangerous were the fish "not eaten more than once per week."

Under my questionable mathematical calculation, that means a range of 300 per cent between our federal guideline and his.

Sawfish, I judge from much of the correspondence, doesn't come by its mercury contamination through any human pollution practices, but from nature's supply of mercury in the water.

So I suggest that Uncle Sam's men and those who disagree with them get together and come up with some reasoned and authenticated conclusions. I'd like to know just in case somebody sets a filet or steak of sawfish before me ever again.

Sawfish is cited as an example, but there are others that come "closer to home" down this way.

A federal study shows that lobster tails may exceed the 0.5 safety margin as the crustacean ages. The report isn't clear whether that means what we know as Maine lobster, or our crawfish, or both. Nor does it tell how we, or the scientists for that matter, can tell a lobster's age.

THE SUBJECT becomes even more confusing because lobsters, or crawfish, live pretty close to the waters man may be polluting pretty heavily; yet their own food would scarcely pass pollution approval.

Hereabouts we have well-nigh eliminated the age consideration; we harvest crawfish so aggressively that they have no chance to get old. Matter of fact, the demand so exceeds the supply now that there is a substantial black market for "shorts," the crawfish that when trapped are supposed to be put back to grow up to be caught at a later and bigger time.

That situation has been abetted by the growing number of crawfishermen. The competition among them has become so keen as to be almost deadly.

SOME years ago up Michigan way, I heard about the great new industry there resulting from the introduction from the Pacific Ocean of salmon into the lake. The salmon spawned, multiplied rapidly and had abundant food because it thrived on an unwanted, so-called "trash fish" which also was abundant.

Soon thereafter I read where it was all over. The salmon had had it! The mercury, or whatever, content in their bodies, was above the safety guidelines.

Recently I was with a visitor from that section of Michigan which had profited most from the salmon industry in its early days. I asked him what they had done to supplement its loss.

"What loss?" he asked. "We're doing better than ever with the salmon."

So I wonder what we can do, in our widely scattered areas, with our widely varying beliefs, to meet these contradictory situations with acceptable conclusions.

154

STUDENT COMMENT NO. 19

Don't Kill Starlings . . . Please

RADFORD, Va. (AP) — When you're trying to teach children respect for ecology and the environment, how do you suddenly spring on them a plan for the mass execution of 120,000 birds?

Kyle Roop, city manager of this southwest Virginia town, is mulling over that question— when he is not answering a telephone barrage of complaints and questions.

"I wish I had never heard of those birds," Roop said this weekend. "It's hard to explain to children and some grownups that these birds are nuisances."

The birds are part of a tremendous flock of starlings that has taken roost in a small wooded area near here.

By night, the birds pack themselves into trees and, one of their neighbors said, the area smells like a "steaming barnyard."

By day, the starlings wing their way out across the hills and valleys of Southwest Virginia where they raise havoc in cattle feed lots, spoiling grain and other feed they do not eat.

Glen Dudderar, a Virginia Tech wildlife specialist, proposed a plan that silenced Roop's telephone ringing.

Dudderar's proposal was for the fire department to turn on the roosting birds a special detergent which he said neutralizes the oil in the birds' feathers so they can't fluff them to keep warm. Their body temperature quickly drops from the normal 104 degrees and they die. Dudderar assured the City Council that the practice has been used successfully elsewhere.

But Dr. Robert Leathers, a college professor who teaches children in ecology classes conducted by a local civic club, said he was immediately swamped by his students.

"Many kids came to me and said, 'You're killing our birds,'" Leathers said. "The kids feel we are letting them down."

He pleaded for at least a stay of execution until the children could be convinced that the starlings are the never-do-wells of the bird kingdom.

Roop agreed to a postponement while conservationists argue that the birds can be frightened away with noise.

They can, Dudderar agrees, but there are probably 250,000 starlings within 50 miles of Radford and may be as many as 10 million in Virginia.

It's very likely, he said, that they will just move to another part of town or split up to remain in a number of smaller flocks.

STUDENT COMMENT NO. 20

Thurs., Jan. 13, 1972 THE MIAMI HERALD

Uncertainties in Anti-Pollution Laws Are Blamed for Shutdown of Pulp Mill

SEATTLE — (AP) — State ecology officials blame the uncertainties of federal anti-pollution laws for the decision by Weyerhaeuser Co. to close a pulp mill rather than meet pollution abatement requirements.

"If the state and the Weyerhaeuser Co. alone had addressed themselves to the problem, they would have found other meaningful solutions," state Ecology Department Director John Biggs said.

"The key is intervention of the federal government into the state's programs," said another department spokesmen. "Industry doesn't know what the federal government wants, and Weyerhaeuser was afraid it couldn't count on federal requirements."

THE COMPANY announced Tuesday that it would close its sulfite pulp mill in Everett, putting the jobs of 330 workers in jeopardy.

Established in 1936, the plant produces 310 tons of bleahced sulfite pulp daily. Sulfite pulp is used for top quality products, such as bond paper.

But the plant pours 4.5 million gallons of diluted untreated sulfite waste into Puget Sound each day, state ecology officials said.

In 1969 the state imposed a clean-up deadline by offering Weyerhaeuser three alternatives. It could install a recovery system that would eliminate 80 per cent of the waste, build a new plant or cease operations.

IN ANNOUNCING that it had chosen the third alternative, Weyerhaeuer said it would close the plant by the May 31, 1973, deadline imposed by the state and would try to find jobs for the mill's workers.

Conversions to a recovery process that would allow liquid wastes to be evaporated and burned would cost $10 million, said K. L. Lamb, Weyerhaeuser pulp manufacturing manager. A new plant would run $52 million, he added.

Although a company spokesman noted that Weyerhaeuser had been unable to meet the state requirements "within the time frame available," Lamb said confused and changing federal regulations "add still further uncertainty."

"There simply is no assurance that even if these millions of dollars were to be spent that the mill could continue to operate," Lamb said.

THE SCOTT Paper Co., in what was called an unrelated move, announced that it will slash its pulp production in Seattle by half beginning Feb. 7. Scott cited "a growing surplus of pulp in the world market." That cutback will affect 100 workers.

STUDENT COMMENT NO. 21

Appeals Court Upholds Injunction Stalling Sale of U.S. Gas, Oil Leases Off Louisiana

THE WALL STREET JOURNAL,
Friday, January 14, 1972

By a WALL STREET JOURNAL *Staff Reporter*

WASHINGTON—A federal appeals court refused to set aside a lower court injunction that has stalled the sale of federal oil and gas leases off the Louisiana coast.

However, the majority opinion by the three-judge panel of the federal court of appeals for the District of Columbia suggested that the Interior Department could satisfy the lower court requirements and proceed with the sale without too much delay.

The opening of bids on about 380,000 acres beneath the Gulf of Mexico originally was scheduled to take place Dec. 21. But five days prior to the sale, a federal district court judge here issued a preliminary injunction barring the sale at the request of the Natural Resources Defense Council. The environmental organization contends in a pending suit that the Interior Department hasn't complied with the National Environmental Policy Act because it failed to discuss all of the possible alternatives to the sale in the related environmental impact statement.

The government attempt to have the injunction order reversed was rebuffed initially at a hearing the day prior to the scheduled sale. At that time, though, the appeals panel, adopting a recommendation of an oil company attorney, ordered the Interior Department to impound any bids it received for a 30-day period. The department now is holding nearly 290 such lease-purchase offers, but will have to return them unopened when the impoundment period runs out next Thursday unless the injunction is lifted before that.

An Interior Department spokesman said department lawyers are weighing the possibility of amending the environmental impact statement for the offshore sale in line with the appeals court suggestions in the hope of getting permission from the lower court to open the existing bids. There wouldn't be time for public comment on the amendments, however. For this reason, the spokesman said, the department most likely will return the bids and not attempt to hold the sale until the statement can be rewritten and full comments received—a probable delay of two or three months.

The Natural Resources Defense Council suit contends the Interior Department should have considered some 10 alternatives to the sale to determine whether any of them represented a smaller danger to the environment. The list includes such possible government actions as eliminating oil import quotas and increasing nuclear energy development.

But on the ground that Congress didn't intend agencies to consider "remote and speculative possibilities" as alternatives to proposed action, the appeals court panel cut the possible list in half. Oil shale development, development of coal liquefaction and gasification and development of tar sands were among the steps eliminated from consideration.

Discussion of environmental effects of the remaining alternatives "needn't be exhaustive," the majority opinion found. "What is required is information sufficient to permit a reasoned choice of alternatives so far as environmental aspects are concerned." Moreover, the Interior Department needn't undertake fresh research, but can make use of studies "of other agencies," the opinion added.

STUDENT COMMENT NO. 22

President's Budget of $246.3 Billion Projects a Deficit Of $25.5 Billion, Which Is Slimmer Than This Year's

Environment

Ignoring Congress' plans for big increases in sewage-treatment construction grants, President Nixon proposes to hold spending authority to $2 billion in the coming fiscal year. The Senate has already passed a $3 billion authorization by an 86-to-0 vote, and a bill approved last month by the House Public Works Committee calls for $4 billion. Mr. Nixon's overall plan for sewage treatment calls for grant commitments of $8 billion over four years, beginning last July 1, or the rate of $2 billion a year. The Senate bill would obligate $14 billion over the four years, and the House committee's version $27 billion.

The only agreement between the White House and Capitol Hill is that grants in the current fiscal year should be at the $2 billion level. Congress has appropriated, and the administration has budgeted, this amount for the current year, but the lawmakers so far only have authorized use of $680 million this year as a stop-gap until work on the new water legislation is completed.

Because federal funds are disbursed to local communities only as work progresses, government outlays run well behind the grant level. Thus, Washington's disbursement for treatment plants—between 30% and 55% of total costs under provisions of existing law—are estimated at $1.1 billion in the coming year, compared with $908 million this fiscal year and $478.4 million in fiscal 1971, when grant authority was only $1 billion.

The administration contends that the President's proposal will stimulate $12 billion in treatment-plant construction in the coming three years. However, the Senate bill seeks to meet a backlog of between $33 billion and $37 billion, as calculated by the National League of Cities-U.S. Conference of Mayors.

THE WALL STREET JOURNAL, Tuesday, January 25, 1972

STUDENT COMMENT NO. 23 : Interested Citizens

Santa Barbara residents of all types, establishment and hippie alike, are still up in arms about the off-shore oil leak that continues to pollute the beaches of their sunny resort town. Almost no one is using the beaches, and motel bookings have dropped 25 to 30% below last year's level. Citizens are angry about a series of ads placed by the Chamber of Commerce in California and Arizona newspapers. The ads, which were actually paid for by the four oil companies who jointly own the leaking well, claim that Santa Barbara is still the same as it always was. Residents feel that this makes the problem look much less serious than it really is.

More serious still, however, to Santa Barbarans is the apparent intention of government and oil company officials to continue drilling. A federal panel has recommended ore drilling in the area of the original leak to stop continued seepage, and the Interior Department has authorized Sun Oil Company to begin drilling again in the same area. State and federal lease holders continue to pump oil from older wells, and other oil companies are asking permission to drill new ones.

Many protest meetings have been held, and even "the gray flannel suit crowd" is asking for extreme action, such as a blockade of the harbor by private boats. A leading businessman who took a boat trip out to inspect Union Oil Company's Platform A (where the original leak occurred) was sprayed with powdered cement and water by platform crewmen. He told a reporter that those who oppose the drilling are becoming desperate. "Nobody responds to us, and we end up doing things progressively less reasonably. This town is going to blow up if there isn't some reasonable attitude expressed by the Federal Government--nothing seems to happen except that we lose."

"Seething Citizenry: For Santa Barbara, The Oil Pollution Crisis is Still Far from Over," by Bill Sluis, The Wall Street Journal, August 27, 1969.

STUDENT COMMENT NO. 24 : University Opposition

Due to opposition led by Duke University and the University of North Carolona, Fiber Industries, Incorporated, has cancelled its plans to build a $100 million textile plant in Orange County, North Carolina. The plant would have employed 1,500 to 2,000 workers in the beginning but would also have dumped waste material into a forest and creek used for research by the two universities. Despite protests, the Orange County Board of Commissioners had been expected to approve the company's request for new "industrial" zoning of the land. The proposed plant had also been approved by aldermen and Chambers of Commerce from Chapel Hill and Carrboro and by the Chapel Hill Board of Education. The company, however, was impressed by the "significant protest" that had developed. President Dietrich explained, "We feel it necessary to have unanimous support of all major organizations in a community."

"Carolina Plant Dropped: Two Universities Opposed It," New York Times, August 10, 1969. Synopsis, ©

TEACHER COMMENTS

TEACHER COMMENT NO. 1 : Evaluation Form for Visuals

There are four major areas of importance indicated on this form. Teachers who grade on a percentage basis should insert a value in each blank to determine the weight of each area in relation to the others, making the sum of all blanks on a perfect item total 100. Teachers using other systems (such as variable points) should determine the proper value of each area. Note: part 4 clarity, has four sub-areas which combine to make the total value for part 4. This form is intended as a suggested guide for teachers and/or students to evaluate visual presentations produced by students.

Student's Name_____ Title or Topic_____

VALUE	AREA OF EVALUATION
_____	1. APPROPRIATENESS If the student has had an opportunity to select either the topic or method of his presentation, is the choice of either or both appropriate to the assignment?
_____	2. ACCURACY Are the facts used in the presentation accurate? If not, where is the inaccuracy?
_____	3. COMPLETENESS Does the presentation represent a complete statement or coverage of the subject (Is there material or facts omitted which makes the presentation misleading) ? If not, where is the presentation lacking?
_____	4. CLARITY Is the presentation clear to the viewer? _____ a. Is the viewer readily able to determine the point or message contained in the presentation? _____ b. Is the presentation free from unnecessary distractions? (pictures, drawings, etc. which do not contribute to the purpose? _____ c. Are the colors and sizes of lines, bars, and/or pictures suitable? _____ d. In the case of a collage or drawing, is the focal point clearly determined?
_____ (Total Score)	COMMENTS:_____

TEACHER COMMENT NO. 2 : Participation Evaluation

The following checklist is offered as an example of a device which may be used to lend a degree of objectivity to evaluating student participation in class discussions. The teacher may involve students in the evaluative process by devising a rotation system whereby two or three students would evaluate class members during class discussion periods.

Only four simple catagories are employed in this checklist. More complex scaling may be included if the teacher wishes to discriminate among cognitive skills of the students, (i. e. recall, synthesis, analysis, etc.). However, this type of scale is not easily employed. The following catagories for evaluation are included in this suggested checklist:

1. Quantity of student contribution.
2. Content of student's remarks as these indicate knowledge of topic, critical and/or innovative thinking by student.
3. Relevance of student's remarks to subject under consideration.
4. Clarity of expression and presentation by student.

The evaluator may indicate quantity of student's remarks by simply placing a check in the appropriate column. The other categories should be rated on the following qualitative scale of 1-4.

1 - Poor (incorrect and/or inappropriate)
2 - Fair
3 - Good
4 - Excellent (complete and appropriate)

The following chart may be adapted for use in the evaluation described above. Simply record student's name when he initially participates and continue evaluation of any of his subsequent comments on same line. There is no need to record the student's name until the point of initial contribution.

NAME	QUANTITY	CONTENT	RELEVANCE	CLARITY
1. Sam Sunshine		3, 1, 2	4, 1, 3	3, 3, 3
2.				
3.				

TEACHER COMMENT NO. 3 : Evaluation Form For Oral Report
(To be filled in by students and/or teacher)

Subject of Report _____ Student reporting _____

I. Knowledge of subject matter and/or what way questions were answered.

_____a. Excellent (5 points) _____b. Good (4 points) _____c. Fair (3 points)

_____d. Poor (1 point)

Points Earned _____

II. Presentation of material by using audio/visual aids. Evaluate each aid used from 0--5 points.

_____a. Charts _____b. Maps _____c. Graphs

_____d. Guest Speaker _____e. Slides _____f. Films

_____g. Filmstrips _____h. Table Display _____i. Study Guides

_____j. Puzzles/Games _____k. Skits _____l. Other

Points Earned _____

III. Equipment used in presentation. Evaluate each aid used from 0--5 points.

_____a. Opaque Projector _____b. Filmstrip Projector _____c. Overhead Projector

_____d. Film Projector _____e. Globe _____f. Chalkboard

Points Earned _____

IV. Speaker's attitude towards listeners, tone, and quality of voice should be considered. Evaluate as #1.

_____a. Excellent _____b. Good _____c. Fair

_____d. Poor

Points Earned _____

V. Evaluation of the participation of the members of the groups. (Use where applicable)

_____a. Excellent _____b. Good _____c. Fair

_____d. Poor

Points Earned _____

Total Points _____

TEACHER COMMENT NO. 4 : Small Group • Self-Evaluation

Instructions: Students are to list members of their group (with the exception of themselves) in the order of how valuable each was in accomplishing the group's goals. The ranking of members is collected and each group member's total score is determined by adding up the number he was ranked by each of his fellow group members. Each student's group rank is determined by listing them from the lowest total score to the highest total score. The member with the lowest total score is considered to be the most valuable.

Sample Form for Students

SMALL GROUP SELF-EVALUATION

Instructions: List group members in the order of how valuable each was in accomplishing the group's goals. Do not list your own name. For example if your group has six members, list five names in the order of their importance to your group's success. By each name indicate the grade you think each member deserves and make any comments about their work that you wish. This individual evaluation will remain confidential.

Rank Order of Members of the Group. (Names)	Letter Grade They Deserve	Comments
1.		
2.		
3.		
4.		
5.		

TEACHER COMMENT NO. 5 : Small Group • Flow of Contributions

Date_____

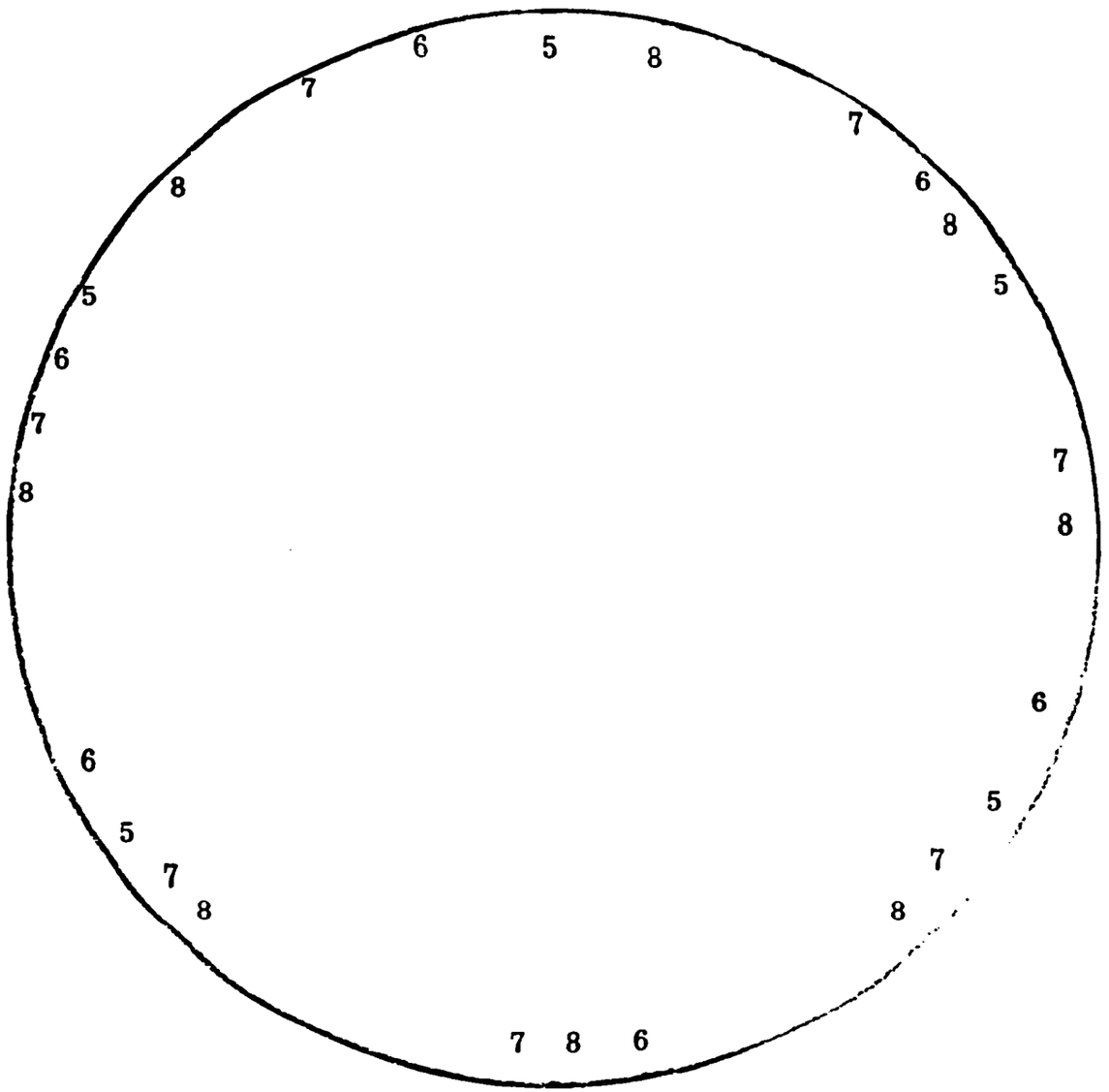
Time_____to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw a straight line from the first person who makes a contribution to each succeeding contributor as long as the discussion proceeds.

Evaluator_____



TEACHER COMMENT NO. 6 : Small Group • Pattern of Contributions

Date_____

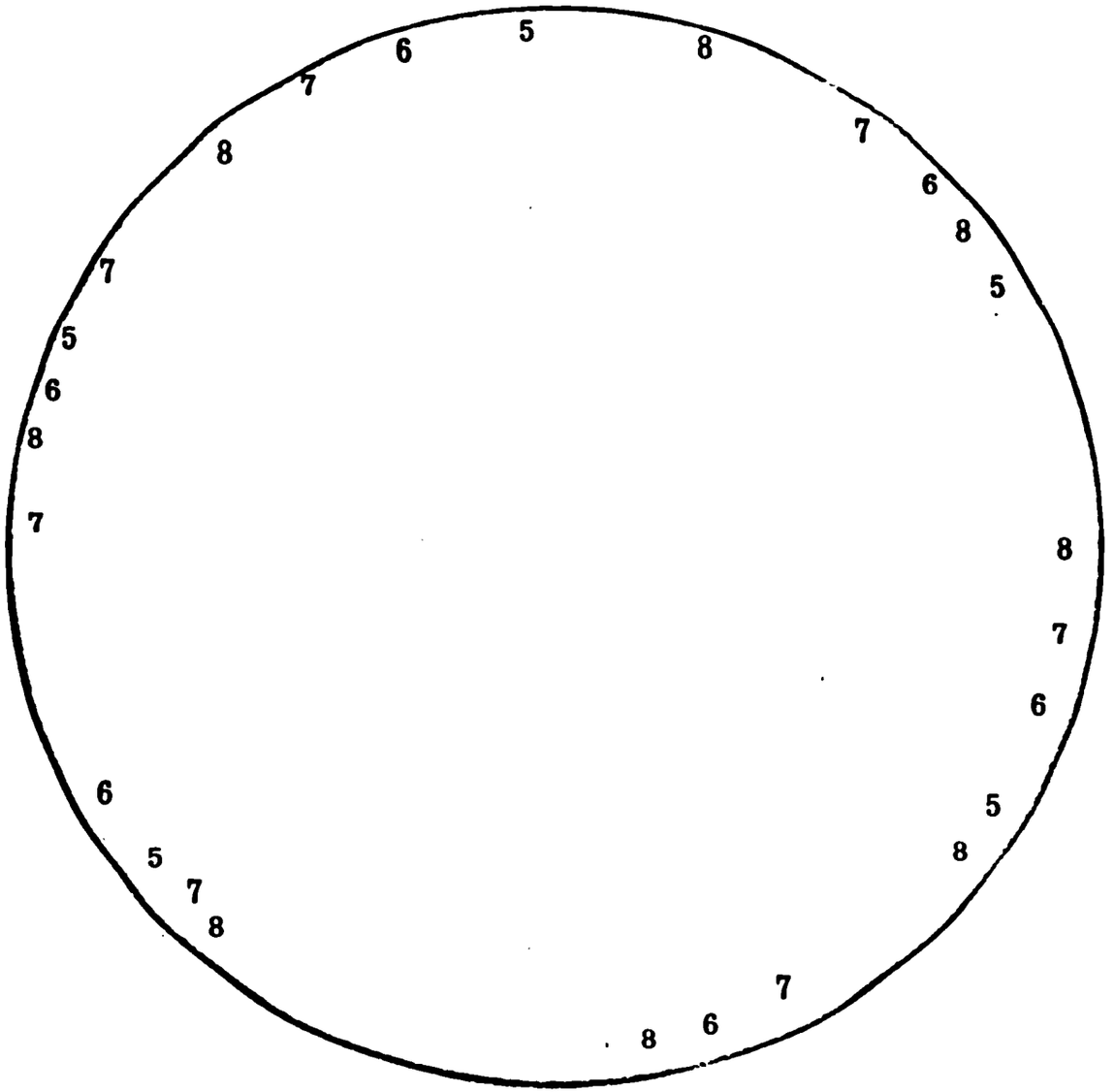
Time_____to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw an arrow (length of arrow in proportion to length of contribution) from the contributor toward the person to whom the contribution is directed. If the contribution is directed toward the entire group, direct the arrow toward the center of the circle.

Evaluator_____



TEACHER COMMENT NO. 7 : Small Group • Individual Evaluation

Date_____ Time_____ to_____ Problem_____ Participation_____

Excellent Poor	Item
1 2 3 4 5	1. Was well prepared for discussion
1 2 3 4 5	2. Used prepared outline properly
1 2 3 4 5	3. Kept running outline of discussion
1 2 3 4 5	4. Contributed readily at every opportunity
1 2 3 4 5	5. Contributions were presented at the proper time
1 2 3 4 5	6. Contributions were brief
1 2 3 4 5	7. Contributions were clearly stated
1 2 3 4 5	8. Showed evidence of a firm grasp of discussion theory
1 2 3 4 5	9. Used constructive reasoning rather than intentional reasoning
1 2 3 4 5	10. Demonstrated objectivity
1 2 3 4 5	11. Reasoned critically
1 2 3 4 5	12. Showed open-mindedness
1 2 3 4 5	13. Provided sources of facts and other bases for opinion readily
1 2 3 4 5	14. Answered questions asked of him readily
1 2 3 4 5	15. Listened well to contributions of others
1 2 3 4 5	16. Demonstrated an attitude of cooperation rather than competition
1 2 3 4 5	17. Talked clearly, distinctly and audibly
1 2 3 4 5	18. Courteous and respectful of others (didn't interrupt, etc.)
1 2 3 4 5	19. Encouraged others to contribute to the discussion
1 2 3 4 5	20. Assisted in providing leadership services
	Total Evaluation
1 2 3 4 5	Rating of total performance in relation to other members of the group
	Group Evaluation
1 2 3 4 5	Rating of the whole group in relation to other group discussions witnessed.

Instructions: Circle the number for each item that tends to represent your opinion about the quality of participation demonstrated.

Evaluator_____

TEACHER COMMENT NO. 8 : Evaluation of Listening Skills

Group Reporting_____

I. ATTENTION GIVEN REPORTERS (check one)

_____ Excellent (5 points) _____ Good (4 points) _____ Fair (3 points)

_____ Poor (1 point)

Possible Points 5 Your Points_____

II. VALUABLE QUESTIONS ASKED OF REPORTERS (check one)

_____ Many (5 points) _____ Some (4 points) _____ Few (2 points)

_____ None (0 points)

Possible Points 5 Your Points_____

III. ADDED INFORMATION GIVEN AND/OR FACTS RETAINED BY LISTENERS (check one)

_____ Much or many (5 points) _____ Some (4 points) _____ Few (2 points)

_____ None (0 points)

Possible Points 5 Your Points_____

Evaluation of (Student's Name)_____ Total_____

TEACHER COMMENT NO. 9 : Haiku: Ancient Poetry for Today's Ecology

Haiku poetry is a short verse from that Japanese poets have used for centuries as a statement of feeling for nature which at the same time is a picture of nature. In the original, each poem contains a prescribed seventeen syllables. Haiku taps the ecological wisdom of the ancients in suggesting that the healthiest environment is that which nourishes and sustains the widest range of living things. Such an environment provides the greatest possibility for mankind to be creative and whole. The following poems are translations from 17th and 18th Century poets:

SO ENVIABLE . . .
THE MAPLE LEAVES
MOST GLORIOUS
ACCEPTING DEATH.
Shiko

EXQUISITE THIS FROZEN
STREAM . . .
TO EVERY RIPPLE
AN ICY FROST-STAR
styled after Buson

A GOOD WORLD IT IS, INDEED . . .
WHERE THE BEETLE
RINGS HIS LITTLE BELL
AND THE HAWK PIROUETTES
Issa

I DIDN'T ENTER . . .
BUT I STOPPED
IN REVERENCE
AUTUMN-LEAF TEMPLE
Buson

THE MUSHROOMS . . .
IN AN UNLIKELY PLACE
THEY APPEAR
TO SHOW THEIR FACES
styled after Basho

TEACHER COMMENT NO. 10 : The Earth as a Closed Environment

After an explosion cut off most of the electrical power, and with it their supplies, aboard Apollo 13 while enroute to the moon, Captain James A. Lovell, Jr., Jack Swigert and Fred Haise, Jr., were faced with a case of survival. Once the astronauts had successfully maneuvered the Aquarius into a "slingshot" course around the moon their return to earth was assured by the law of physics. Their problem now became one of physical survival in a closed environment during that return voyage.

In the closed system required for human space travel, all that is necessary to sustain life must be contained within the vehicle. The astronauts concentrated on their supply of life-preserving "consumables." The most vital of these was oxygen. Initial calculations determined that their oxygen supply was sufficient for the return trip. Water was essential not only to sustain the lives of the astronauts, but also as a coolant for the physical operation of the environmental control system of the vehicle. During their final day in space the astronauts consumed the last of their drinking water. Although there was water available, they could biologically survive (temporarily) without it, whereas depriving the vehicle of its minimal supply would have caused complete failure of the closed environmental system on which they relied. Their temporary abstinence may have been the cause of the urinary infection developed by Haise.

Due to the need for conservation of electrical power, all equipment and systems outside the small lunar module "Aquarius" were turned off. This caused the temperature in the command module, "Odyssey," to drop to 50 degrees, and in Aquarius to 38 degrees. Lighting was also turned off. Luckily, temperatures remained tolerable. Otherwise, use of additional clothing could have led to excessive perspiration with possible feared results of pneumonia and/or increased dehydration.

Their most serious environmental problem soon became apparent. Whereas they had enough

oxygen, the environmental system of the small lunar module was inadequate to take care of what the men breathed out, carbon dioxide. In normal operation the carbon dioxide is allowed to become one per cent of the astronauts' atmosphere (33 times the percentage of CO_2 in earth's natural atmosphere). But a higher percentage than this can lead to deteriorating performance, drowsiness, and death. The astronauts solved this problem by rigging a makeshift pipeline through the lithium hydroxide filtration cannisters in Odyssey.

The final survival problem was the elimination of urine. Due to the precarious navigational situation they could not risk the normal system provided. It became necessary to utilize every bag available in the lunar module to store the waste.

The survival factors involved during the 80 hours of the Apollo 13 flight following the accident made the world aware, as it watched and listened to this drama unfolding, of a few of the problems facing National Aeronautics and Space Administration scientists as they prepare for such projected voyages as the Mars Stopover - 400 days - and the Jupiter Flyby - 1400 days. The difference in life-support systems between the one used for Apollo and that needed for Mars or Jupiter is one of kind, not degree. Apollo uses an "Open System" where the life-giving essentials are brought on board, consumed en route and the waste eliminated. It is a one-way system with a fixed limit to consumption and survival. For the much longer duration voyages a "closed system" is required since no spacecraft is big enough to carry all the consumables needed. The closed system, as defined by NASA is, "Recovery of oxygen, water, and food from wastes; food supplement is provided." The system under experimentation and study will supply 85% of an astronauts biological needs by converting human metabolic wastes into food, water, and oxygen. The other 15 per cent must still come from stored foods. It is interesting to note that, although this system contains 44 possible life-support sub-systems or parts of sub-systems that permit 675,000 kinds of combinations, the system is still not completely a closed system (note the 15% needed stored foods). Also, ". . . aside

from the prospects of difficult engineering hurdles yet to be overcome, it is also clear that enormous gaps exist in our fundamental knowledge about many aspects of this problem." according to Harold Klein, NASA's Assistant Director for Life Sciences. He is referring to the biological aspects of sustaining life in a closed system; nutritional requirements of man, human production of contaminants, biological agents for conversion of human wastes to useful foodstuffs, etc.

It is fascinating to compare the partially closed system which man is attempting to develop for space travel with a life-support system that is self-building, self-evolving, self-repairing and self-perpetuating. A system that has safely navigated the inimical environment of space for untold eons. A system that instead of bacterial cells and carbohydrates provides lobsters, truffles, champaigne, coffee and cream, bread and oranges. A system that is completely closed and with such a myriad of components dovetailing that, in contrast to the 675,000 combinations posited for a man-made spaceship, would overload the most resourceful computer system asked to write the equation for even one day's interactions.

That system is EARTH, and these systemic interrelationships are what ecology is all about.

TEACHER COMMENT NO. 11 : Our Diminishing Resources

The table below lists some of the irreplaceable natural resources which are vital to modern industry. The United States has 6 per cent of the world's people and uses between 40 and 50 per cent of the world's irreplaceable natural resources. You may find this to be an interesting tidbit of information. However interesting, it does not become significant or impressive as long as we have an infinite supply of those resources. The questions which we must refer ourselves to are: Do we have a limited supply of these irreplaceable resources? If so, what are our expectations for the future? The following table does not provide an answer to either of these questions, but it is an aid in understanding the existing situation. Please keep in mind all of the variables which are not taken into account such as presently undiscovered reserves, ore which is presently considered marginal, recycling, etc..

Resource	Static Reserve Index in years	Exponential Reserve Index in years at 2.5% increase	Current rate of increase (%)
aluminum	175	67	8.0
chromium	560	108	4.0
cobalt	155	63	4.6
copper	40	28	3.3
gold	17	14	2.5
iron	400	98	3.8
lead	15	13	2.0
manganese	180	68	4.5
mercury	13	13	3.0
molybdenum	100	51	5.0
nickel	140	60	8.7
platinum	20	17	8.5
silver	20	17	6.0
tin	25	19	6.0
tungsten	40	28	5.0
zinc	18	15	6.2
coal	900	127	3.6
natural gas	35	25	6.6
petroleum	70	41	6.9
uranium	66	40	6.0

EXPLANATION:

STATIC RESERVE INDEX gives the number of years our known world reserves of that resource will last if we continue consuming it at the same rate we do today.

EXPONENTIAL RESERVE INDEX shows how long the reserves will last if the usage rate increases by 2.5 per cent per year.

CURRENT RATE OF INCREASE shows, for comparison, what the ACTUAL growth rate in world consumption for each resource is today.

TEACHER COMMENT NO. 12 : Man vs. Florida

BEACH EROSION

Two-thirds of Florida's 780 miles of beach and shoreline are suffering from erosion problems, over 200 miles of it critical, according to the U. S. Army Corps of Engineers. Much of this is due to improper oceanfront construction and other abuses of nature by Man.

In Dade County, the estimated cost of restoring the Miami area beaches, where waves are now lapping at the seawalls of some of the most exclusive hotels in the nation, will be over $35 million.

After being informed by experts that nearly $50,000 worth of sand had eroded from Cape Canaveral beaches in 10 days, the Brevard County Commissioners approved the expenditure of $160,000 as its share of a $640,000 two year beach renourishment program which will begin in the Spring, 1973.

WATER POLLUTION

In 1968, Marine Biologist Robert Routa warned that one section of the planned Pineda Causeway to be built across the Indian River in Brevard County, Florida, would destroy or adversly affect "perhaps the finest spotted sea trout habitat in the world and one of the best waterfowl areas in the state." On April 16, 1972, the Pineda Causeway was opened to the public.

A water quality study conducted by a University of South Florida biologist in the Tampa area blames housing area developers along Florida's west coast for fingerfill canals choked with gangrene-causing bacteria. In 80 different locations sampled, over 50% of the places contained dangerous proportions of gas-gangrene organisms along the bottom of the canals. Also, 78% of the locations tested showed 1,000 or more coliform per half-pint, and 62% were above 2,400 count (a count of 1,000 or more indicates water

unfit for human contact). Both of these pollutants are traceable to human wastes. Sewage, pesticides, refuse and organic wastes accumulate in these canals: the design of the canals excludes oxygen and prevents bacteria from decomposing.

The results: general health hazard; "If you cut your foot and fail to treat it, you stand a dilly of a chance of getting a bad infection or even gas-gangrene." The bacteria can cause food poisoning and possible intestinal gangrene; one strain found here, Clostridium perfringens, was blamed for wildlife kills recently in Lake Okeechobee.

Hyacinths were introduced into Florida's waterways 80 years ago. They now cover 120,000 acres of Florida's inland waterways. They are considered a pest and nuisance by boaters, fishermen, and others. Three and a half million dollars are spent annually by the taxpayers to fight hyacinths in Florida which have no natural enemies. The results, to date, have been negligable. The hyacinths continue to flourish in spite of man's efforts.

Game and Fresh Water Fish Commission biologist Dave Cox says the very existence of the mighty St. John's River is being threatened. Cox says, . . . "already irreparable damage has been done. Contamination has reached a point near Jacksonville where the St. John's is considered a health hazard. It has already been proven persons may contact as many as 16 communicable diseases if they consume any of the river water." Without the marsh, which acts as one of the best trickling filter systems ever devised, the river would become just as dead as the Escambia River, now considered the most polluted in all of Florida, according to Cox. "Millions of acres of valuable marsh land have already been lost to developers, and unless some immediate steps are taken by the state to prevent further destruction of marsh in the basin, the St. John's will be in real trouble."

Air Quality Insurance

Florida's Department of Pollution Control recently held public hearings on the quality of air in our state.

Florida has less of a problem in this area than many states, which makes it even more important that we not let the quality we enjoy degrade in any manner. Much of the state, for example, already exceeds federal standards, a status which should encourage us to adopt tougher-than-federal requirements for clean air.

Brevard County is a good example. The only obvious polluters of the air in Brevard are the two power plants on the Indian River, a small asphalt plant and automobiles. Because of our exposure to ocean breezes, the air is clear most of the time.

But that's no reason to take it for granted. Power plants do pollute, despite the fact that modern technology is available which could bring emissions under control. As the area grows this will become even more of a problem, if we let it.

Automobiles are another problem. Exhaust isn't a big problem here, not now, but it can be someday. That's why we need tough exhaust control laws such as those in effect in California. We need them now, not after the problem becomes obvious.

The Environmental Information Center of the Florida Conservation Foundation takes a tough stand on Florida's air quality, and we think they are right. Among the recommendations they support are the following:

- The Department of Pollution Control should expand its authority in testing and inspection of automobile emissions.
- Land use control should be used when necessary to control air pollution.
- Florida's varied environmental programs should be coordinated closely on a state level.
- After the 1975 air quality standards are met, the standards should be reevaluated to make sure they are sufficient.
- The department should insist on development of a statewide urban transit system to make air quality standards possible.
- No area of the state should be allowed to degrade its air quality, even though it might be better than the law now requires.
- The department staff needs expansion, and the enforcement arm should be decentralized for more effectiveness.
- Current traffic patterns in downtown Tampa, the worst polluted city in Florida, should be altered to enforce the required air standards.
- The department should make long-ranged plans for Florida air quality, taking into account the need for transportation and power.

You will hear grumbles about the department as it is now set up, and loud complaints about some of the above proposals to strengthen the department.

Technicalities aside, we are talking about the quality of the air we breathe, and what our children and their children will face within the future.

Just because things aren't too bad now is no reason to sit back and relax. Even Birmingham, Ala., used to have clean air.

TODAY, Thursday, December 2, 1971

Landowners Oppose Big Cypress Purchase Proposal

MIAMI (AP) — Former Florida Gov. Fuller Warren, opposed to federal purchase of 500,000 acres in Big Cypress Swamp, told a Senate subcommittee: "Next to the air we breathe, this nation's most precious resource is revenue."

Warren, governor from 1959-53, acted as spokesman for landowners who appeared Tuesday at the first public Big Cypress hearing held by the Senate parks and recreation subcommittee.

Collier County officials joined in opposition to a bill cosponsored by Democratic Sens. Lawton Chiles of Florida and Henry Jackson of Washington.

Florida News

Both senators were greeted by boos and catcalls when they urged speedy approval of the bill.

Collier County Manager W. H. Turner estimated that federal ownership of the pine and cypress swampland in southwest Florida would remove "one-third of the land in Collier County from the tax rolls."

Loss of tax revenues from the swampland, Turner said, could cost the county as much as $750,000 a year.

"The Big Cypress is jeopardized by the pressure for progress based on sometimes well-intended but too often ill-planned development," Chiles countered.

WILDLIFE

The Brown Pelican, once a fixture along both coasts of the United States, is making its last stand in Florida. The growing use of pesticides, the urban coastal development, and man himself have wiped out pelican colonies in California, South Carolina, Louisiana and Texas.

Today, an estimated 75 per cent of North America's Brown Pelican population nests along the Florida peninsula, and there are growing signs that the bird's demise here may not be far off. Fewer than 20,000 pelicans are believed to remain in Florida in 1972. People outnumber pelicans more than 300 to one. The latest count of nests--the surest indicator of the future stability of the species--dropped from 7,690 last year to 5,923 this year. The buildup of pesticides in pelican egg shells, which foreshadowed the bird's failure to breed at all in California, is now firmly established in Florida rookeries. Civilization's encroachment into the coastal areas is also making the pelican's life more difficult. No nesting areas remain along the highly-developed southeast coast of Florida.

TEACHER COMMENT NO. 13 : The Broken Continuum

The average American generates 1/4 pound of feces per day. This amounts to a national daily production of more than 50 million pounds or 23,000 long tons of waste matter. (Although there are no international statistics available, there is no reason not to assume that, for purposes of international study, a similar figure for individual production can be used.) Since this material is esthetically repulsive to humans, has ceased to be nourishing, and is medically harmful to humans, it is regarded as "waste". Also, since it is impossible to turn off this production, the problem becomes how to get rid of the stuff. Civilized man has contemplated this problem and found various solutions as his population has increased and his technological sophistication has progressed. The solution favored today is the flush toilet, the innovation of a gentleman named Thomas Crapper who gave his name to the language as a common noun. In cities, men were quick to connect onto the built-in removal facility of the nearest waterway, such as the storm sewers. Finally, such disposal was legitimatized, encouraged, and even compelled.

The results of this disposal of "waste" have been far-reaching. In 1970 raw sewage as well as other pollutants were found in tidal bays in 16 of the coastal states of the United States. It is estimated that each American contributes 135 gallons of sewage (contaminated water) each day. In order for the waters to self-purify, 4000 gallons of water are needed to purify or dilute each individual's 135 gallons of daily sewage. At this rate, the entire flow of the United States would self-purify the sewage of no more than about 250 million people IF THEY WERE PERFECTLY DISTRIBUTED. Presently, 120 million Americans are served by sewers. But, in addition, industry--which provides pollutants which require three times the amount of water to self-purify as individual wastes--is also disposing of "wastes" through sewer systems. Thus, it becomes immediately clear why ALL 22 major river basins in the

United States are degraded or endangered.

In 1962 research indicated that 20 per cent of the sewer systems in America dump raw sewage; 30 per cent provide primary treatment--removal of solids and about one-third of the biochemical oxygen demand (BOD) which requires water for self-purification; and 50 per cent provide secondary treatment--removal of solid waste and about 90 per cent of the BOD. But still, about one-half of the nitrogen and one-third of the phosphorous remain in the residual sludge and contribute substantially to the eutrophication of American waters.

Although we have looked on human sewage as "waste" for many years, and have devoted our money and energies to elimination, it becomes apparent that this "waste" which provides nourishment for bacteria, algae, plant life, and other organisms in the waterways is not really "waste." They are really another resource which is out of place. Farmers buy artifically produced nitrates to encourage growth of crops while, at the same time, naturally produced--inevitably produced--nitrates from humans and farm animals go into waters to stimulate unwanted biological growth.

If Americans don't drown in polluted waters, they may well be buried under an avalanche of "solid waste." Every year we produce 48 billion more cans, 28 billion more bottles and jars, 10 million more cars and trucks, half a billion pounds more of plastic, and a myriad of other items which eventually become "garbage." Each American creates about 10 pounds of refuse each day; half of it is carted away. The solid waste problem looms over every great American city. They are being buried. And, every year, more Americans are throwing away more things. New York City is presently facing a gap of perhaps eight or more thousand tons of garbage a day MORE than their present facilities can dispose of. Disposal facilities are planned, technology provides more efficient means of disposal, but, at the same time, daily collections increase as individual contributors and contributions increase.

The problem is threefold. First, solid wastes are looked upon as "wastes"; second, the "problem"

is assigned to a miniscule segment of society for solution; and, third, no government takes a realistic, holistic, view of the process. All of these conditions reflect a lack of knowledge about ecology.

Geophysicist Athelstan Spilhaus, 1970 president of the American Association for the Advancement of Science, says, "I believe we must base the next industrial revolution--a planned one--on the thesis that there is no such thing as waste, that waste is simply some useful substance that we do not yet have the wit to use. In the next industrial revolution, there must be a loop back from the user to the factory, which industry must close."

Limnologist, Gerald Lauer was led to conclude, in a water pollution study for the Ecological Society of America, that "waste" simply represents a rupture of the recycling system. He said, "When resources are depleted, men will mine trash heaps and be glad to do it. But why must we wait until the resources are gone?"

It is apparent that the "wastes" problem is bound up with pollution, overburdening natural ecosystems, externalities and the economic distortions of ecological reality, recycling, the impossibility of an open system of materials; the interrelatedness of all, and the interdependence of all upon environment in a closed system; in short, the principles of ecology. The recycling, reuse of "wastes," human and other, would serve not only to protect our diminishing resources, but would diminish our pollution of the environment and greatly enhance the sum and substance of human habitation on earth.

It is only natural that individuals, governments, and industry should be concerned with the economics of such action. The oftenheard excuse that "the cost is prohibitive" is often immediately true in light of the present knowledge of the individual, government, or industry. Former New York City Sanitation Commissioner Samuel Kearing, Jr., says, "Today, more than fifty per cent of municipal refuse consists of paper, but a practical process for separating paper from run-of-the-mill refuse does not exist. Of course, if the cost of disposal were applied to the cost of the product--it costs six to eight dollars

a ton just to burn paper in a N. Y. incinerator--the entire picture would change. Suddenly the manufacturers of newsprint and cardboard containers could justify investments to reclaim and recycle used paper." Kearing also says, "As Sanitation Commissioner I was unable to find a single paper manufacturer interested in discussing the recycling of paper. I was told it was cheaper to grow pulpwood than to reclaim used material." As it happened, the Garden State Paper Company of Garfield, New Jersey, was already converting used paper into competitive newsprint. In 1969 this company converted 365,000 tons of old newspapers into 320,000 tons of fresh newsprint; and sold the newsprint for 12 dollars less a ton than paper made from virgin pulp. Newsprint made from reclaimed newspaper in America conserved more than 5 million trees--not to mention the conservation in the solid waste problem, according to a spokesman for the American Forest Institute. Moreover the reused newsprint can be reprocessed again and again with a 10 to 15 per cent loss in material. And, please note, with a lower cost to the consumer and no loss of profit to the supplier.

Education, awareness, are the answers. Some solutions are available, being used, and can even be economically advantageous. Ingenuity and invention await only coherent leadership. Technology, the servant, is waiting for its masters to learn that the laws of ecology can be neither ignored nor defied indefinitely. Waste, like pollution, is a measure of the ignorance and defiance. Individuals, governments, and industries must re-think--not the elimination of "wastes", but the re-use of resources; react--not the great cost of the solution, but the inescapable cost of ignoring the solution; reassign priorities--not nature for the benefit of man, but man and nature for mutual benefit of both.

It will be interesting to see how much filth, how high the mountains of trash must accumulate, before the masters obey.

TEACHER COMMENT NO. 14 : The Hell of Eco-Destruction

Only a few years ago, mankind lived on this planet secure in the knowledge that he was master of his fate and that all was well and getting better all the time. Today, those very scientific advances that we used to tell ourselves would make life better, have now informed us that we face the possibility of a dismal future and eventual extinction.

Within the next century we may find that man is only a small step in an ongoing scheme which will result in beings far superior to ourselves. In the meantime, however, it is ourselves who are "in charge" on this planet and although we seem to have developed the strength of technology to prevail over the other creatures, we seem to have failed in our ability to develop an equal degree of sensibility to rule responsibly.

We often appear to be infatuated with our ability to create "things" and we marvel at the complexity of our inventions. But are these "things" any match for the beauty and function of nature? Of course not, yet if we continue on our present course we may offer our offspring no alternative to "man-made life." How would our souls react to a world without wildlife, without trees and plants. It is nature which holds the key to our future as well as our past and to consider even for a moment that man can survive without the functions of his natural environment is sheer folly.

Man has often been responsible for the destruction of animal species. From 1 A. D. to 1800, it is estimated that man brought about the extinction of one specie every fifty years, from 1800 to 1900 the rate leaped to one specie every 1. 5 years, at present the rate is running at one specie a year. Add to those figures the over 1000 listed as in danger and it becomes clear that man has precious little time left to save the domain over which he reigns.

In 1965 the New York Times noted:

> Certain United States business interests, including some noted retail stores, are currently promoting the sale of rugs, upholstered items, and articles of clothing made of the skins of polar bears, Asian tigers, Brazilian jaguar, and African lion, leopard, and cheetah. This merchandising is contributing substantially to already great pressures on wildlife through hunting and habitat destruction.

These promotions only help to keep in business those who prey on these and other creatures. Does this type of activity reflect the level of development of a society able to make the right decisions regarding its future?

If at some future time man contacts intelligent life elsewhere in the universe, will that life (if superior to our own) accept us into the wider community of creatures or will it, after seeing our miserable failure to preserve and protect our natural environment, decide to condemn us to dying out on our own dead planet?

ENVIRONMENT '71 ADVERTISEMENT

Everyone's at fault... including you

by WILLIAM HOUSEMAN, Editor, The Environment Monthly

We all pollute. That's a fact. We pollute as individuals. We pollute as families, as communities, as industries and, yes, even as local, state and federal governments. Why? *Not because we intend to.* But simply as a consequence of how we live—and how we *wish* to live. Consider, for example, one highly visible result of our style of living: We Americans comprise about 6% of the world's population, yet we use about 40% of our planet's processed natural resources. And while we spend $4.5 billion annually on the collection and disposal of solid waste, scarcely half gets carted away.

Lately, we have experienced an environmental awakening. Pollution, we now realize, is often an unwelcome by-product of progress. We have discovered that many of the goods and products which we have demanded and around which we have fashioned more convenient, comfortable lives come with an inherent capacity to pollute. They may cause pollution problems as they are manufactured, when they are used and after they are discarded.

To achieve a safe and wholesome environment, we need to satisfy our modern living needs with products and processes that don't pollute—either at the factory, at home or in our local communities. And we need to do so quickly. Experts tell us that by the year 2000 we will be forced to struggle with, among other problems, triple the present solid waste.

Clearly, we must put a better environment among our goals of better living and genuine prosperity—both as individuals and as corporations. Like the companies and associations whose successful efforts to combat pollution are told on the following pages, all Americans—including you—must accept a share of the blame for our problems, and also a share of the responsibility for solving them.

Reprints of this Environment '71 Advertisement available from P.O. Box 5905, Grand Central Station, New York, N.Y. 10017. Cost of postage and handling: 10 reprints—50¢; 50—$1.50; 100—$2.25; 1000—$10.00.

TEACHER COMMENT NO. 16 : Sonnet 58: Anno Domini 2023

He swept the garbage off the
moldy log,
Then retched, and stumbled
through the stinking smog;
It was a day like any other day--
The Sun was struggling through
the brown and gray.
At last there came a wisp of acrid
breeze,
He saw the mountain's smear of
rotting trees;
He waded to his armpits through
the cans
And broken bottles, meanwhile
making plans
To signal for a rescue team from
Mars,
Or failing that, to radio the stars
To lend a planet, fair and clear
and green--
Like Earth of Legend--which
he'd never seen.
The Buzzard watched him
smoke a Cigaret;
In slime and scum the Sun with
loathing set.

-Leo Holcomb

TEACHER COMMENT NO. 17 : Soviet Pollution

According to Marshall I. Goldman of Wellesley College, reports from Russia match every pollution story told from New York to Los Angeles.

The Soviet moves to reverse the flow of major rivers could effect the earth's rotation and change the ecology of the entire world.

In 1965, a cigarette thrown in the Iset River set that river afire.

The Ukraine's Mologna ia River is reported dead.

Two-thirds of Russia's factories discharge their waste untreated or without cleanup.

In 1965 effluent from the Chernorechensk Chemical Plant near Dzerzhinsk killed almost all fish life in the Oka River.

Russian mines, oil wells and ships freely dump waste into the nearest body of water.

Oil from slicks has coated the shores of the Baltic, Black and Caspian Seas. This has been partially responsible for the troubles in the Russian caviar industry which has led to experimenting with artificial caviar substitutes.

Only 40 per cent of Soviet cities have sewage treating equipment.

Most Soviet cities have air pollution. Leningrad, for instance, has 40 per cent fewer clear daylight hours than nearby Pavlovsk.

The ecology of the Lake Baikal area has been so disrupted by tree-cutting and other disturbances, dunes from the Gobi Desert have already started to move in, raising fears that desert will sweep into Siberia.

Water is being pumped out of Russia's lakes and seas so rapidly some authorities fear that in 29 years the Aral Sea will be a salt marsh. The Caspian has fallen 8 feet in two decades.

If enough of Russia's northward flowing rivers are diverted for irrigation purposes to the arid south, the Arctic Ocean will be deprived of the warmer waters it receives from these rivers, causing the ice cap to grow southward.

TEACHER COMMENT NO. 18: A Vision of a Pristine and Unspoiled Land

In the moneth of June, Anno Salutis 1622, it was my chaunce to arrive in the parts of New England with 30 Servants, and provision of all sorts fit for a plantation: and whiles our howses were building, I did indeavour to take a survey of the Country: The more I looked, the more I liked it. And when I had more seriously considered of the bewty of the place, with all her faire indowments, I did not thinke that in all the knowne world it could be paraled'd, for so many goodly groves of trees, dainty fine round rising hillucks, delicate faire large plaines, sweete cristall fountaines, and cleare running streames that twine in fine meanders through the meads, making so sweete a murmering noise to heare as would even lull the sences with delight a sleepe, so pleasantly doe they glide upon the pebble stones, jetting most jocundly where they doe meete and hand in hand runne downe to Neptunes Court, to pay the yearely tribute which they owe to him as soveraigne Lord of all the springs. Contained within the volume of the Land, Fowles in abundance, Fish in multitude; and discovered, besides, Millions of Turtledoves one the greene boughes, which sate pecking of the full ripe pleasant grapes that were supported by the lusty trees, whose fruitfull loade did cause the armes to bend: which here and there dispersed, you might see Lillies and of the Daphneantree: which made the Land to mee seeme paradice: for in mine eie 'twas Natures Masterpeece; Her chiefest Magazine of all where lives her store: if this Land be not rich, then is the whole world poore.

Thomas Morton, New English Canaan

TEACHER COMMENT NO. 19 : Consider the Oceans of the World

Many of us recently have become aware of the importance of the oceans which cover more than two-thirds of the earth's surface. Since the beginning of time the seas have served as highways for transportation. The waters along the shorelines have offered many opportunities for recreation. They have also been a source of nutritious foods and certain valuable minerals. Now many people look to the oceans as a possible solution for the world's growing food problem as well as a source of scarce minerals.

Some scientists have declared that the world's population crisis which will produce millions of hungry mouths can be solved by the supposedly inexhaustible food supplies from the ocean. Unfortunately facts offered by other scientists do not support this hope. They point out that the whaling industry is aggressively killing off the whales, commercial fisheries are depleting fish stocks, seafood is becoming more and more scarce, and the world's family of nations seems unable to agree upon any rational plan for conserving these resources.

The worst threat of all is pollution. The ocean can no longer absorb the pollutants along many miles of its shorelines and it has been discovered that in many places some forms of pollution now extend hundreds of miles out from the coast. Plastic bottles, blobs of oil, and other refuse have been seen drifting in the middle of the Atlantic Ocean. Tissues of coastal wildlife in Antarctica have been found to contain traces of pesticides that have never been used in that region.

One of the most serious effects of pollution is the destruction of the photosynthesis process carried on by marine phytoplankton. These are the microscopic plants and animals which float free in the waters of the ocean. They are responsible for most of the food we take from the sea and appear to be susceptible to DDT. Thus, if photosynthesis is reduced, the amount of life in the ocean will diminish.

If marine photosynthesis ceases, all sea life will die. Marine photosynthesis has another and just as important function: making oxygen, so essential to human life. About 70 per cent of the earth's oxygen is made by ocean phytoplankton.

Adrian A. Paradis, Reclaiming The Earth.

132

TEACHER COMMENT NO. 20 : The Myth of Superabundance • 19th Century Origins

It was the intoxicating profusion of the American continent which induced a state of mind that made waste and plunder inevitable. A temperate continent, rich in soils and minerals and forests and wildlife, enticed men to think in terms of infinity rather than facts, and produced an overriding fallacy that was nearly our undoing--the Myth of Superabundance. According to the myth, our resources were inexhaustible. It was an assumption that made wise management of the land and provident husbandry superfluous.

A growing nation needed wood for housing and fuel and shipbuilding, and the biggest of the Big Raids began in the woods. The virgin forests of North America were among the masterpieces of the natural world: east of the Great Plains nearly every acre was covered by trees; to the west softwood stands flourished on the slopes and in the valleys of the Rocky Mountains; and rising above the Pacific shore line, in the most productive timber zone in the world, redwood and fir stands provided a crescendo of arboreal splendor.

Europe had hardly a dozen tree types. The American expanse had more than a hundred, and our many soils and climate zones produced the largest and oldest trees, and the most accessible commercial stocks on any continent. The first task of forest-bound colonists was to develop woodsmanship: homes and stockades had to be roughhewn, land cleared, and firewood cut. Farming awaited the work of the broadax: clearings could be carved out of the virgin thickets only through great effort or by the deliberate use of fire.

Tree cutters were the advance men of agrarianism, and the worst acts of forest destruction were oftentimes explained away with the carefree rationalization that such devastation was necessary to "let daylight into the swamps." The common assumption was that trees, like Indians, were an obstacle to

settlement, and the woodsmen were therefore pioneers of progress.

In addition to lumber, the resources of land, oil, minerals, natural gas, and wildlife were each, in time, incorporated into the Myth of Superabundance.

Stewart L. Udall, The Quiet Crisis.

194

TEACHER COMMENT NO. 21 : The Responsibility to Recognize

Prudence demands and history indicates the necessity of examining the nature and potential of new goods and services, so that we may understand their impact on man and nature before, not after, their use.

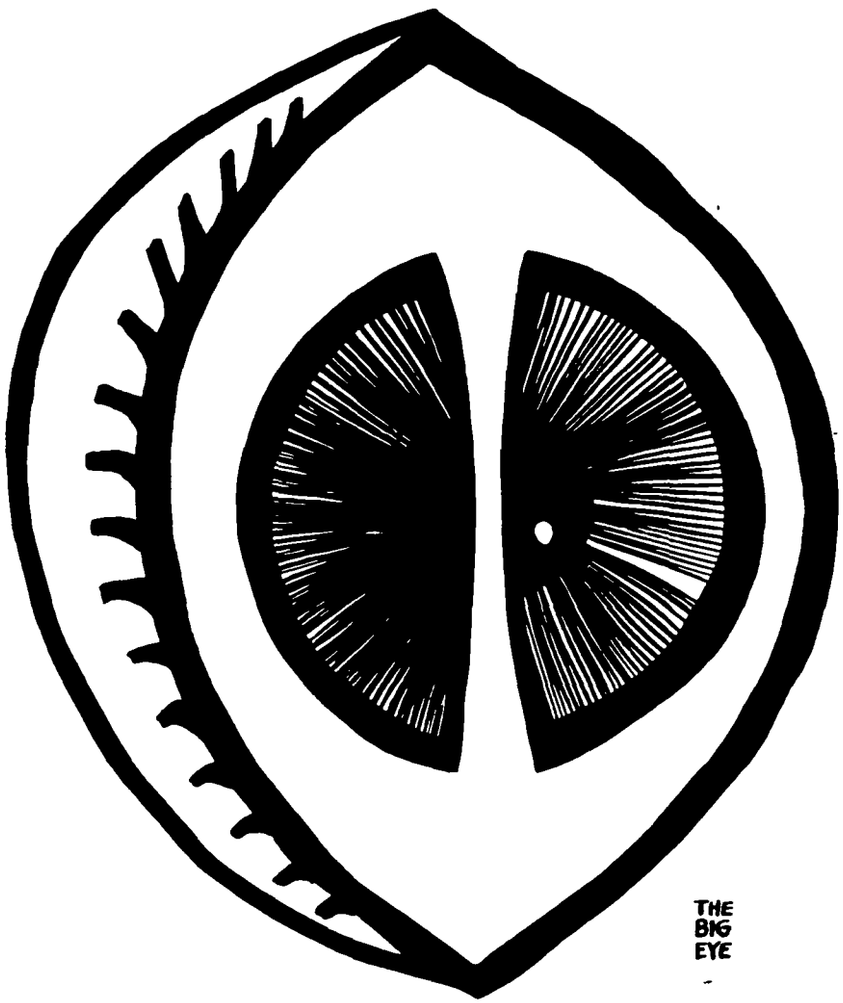
In the headlong rush to provide more and more consumer goods to supply what was assumed to be an everincreasing population, we have forgotten, or perhaps never recognized, that we live on a finite planet whose environment is fragile, biologically interdependent, and self-contained. All the resources we require, except the energy of the sun, must be found on this earth and in its atmosphere. All of the wastes we produce by transforming these resources into evanescent products and services for consumers must be strewn or stored somewhere on the earth, unless they are recycled into the intricate system, which, but for the hand of man, is self-restoring. Nonrecycled wastes not only blight and befoul the environment, but also gradually diminish the irreplaceable resources of the system.

We have largely ignored the crucial importance of recycling materials. More seriously, we have ignored the vital fact that we are utterly dependent on the natural cycles of a thin and fragile layer of living plants and animals which exist where conditions of air, water, and solid earth combine to favor life, and which our scientists call the biosphere. These cycles can, of course, be seriously disrupted by our industrial and agricultural activities. Combustion in the furnaces and engines that power our industrial system produces such vast quantities of carbon dioxide that the foliage of the earth and the plankton of the sea may not be able to convert it back to carbon and oxygen. In turn, this may alter the heat-absorption capacity of the atmosphere and cause the earth's climate to grow warmer, melting the polar ice and raising the level of the seas. In addition to carbon and oxygen, there are numerous other elements that interact in this geochemistry--nitrogen, phosphorus, potassium, calcium, sulfur, and iron, for

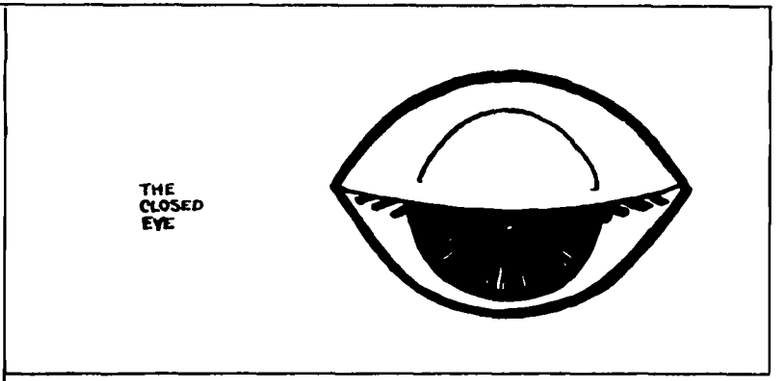
example--and that play indispensable roles in plant and animal metabolism.

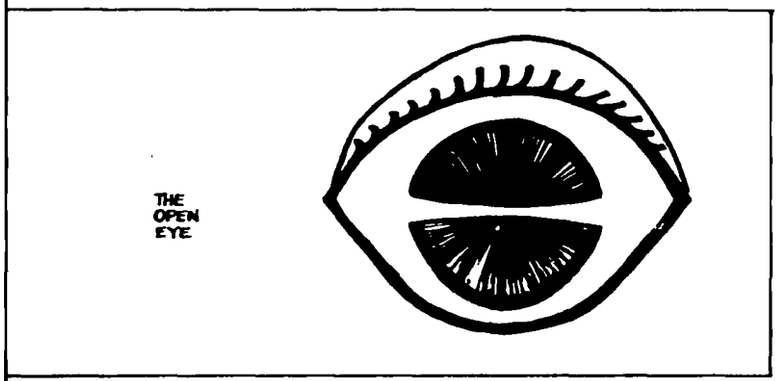
Stewart Udall, 1976: Agenda for Tomorrow.

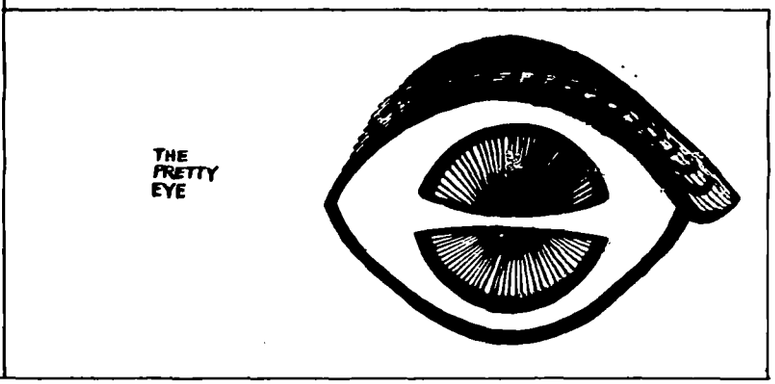
TEACHER COMMENT NO. 22

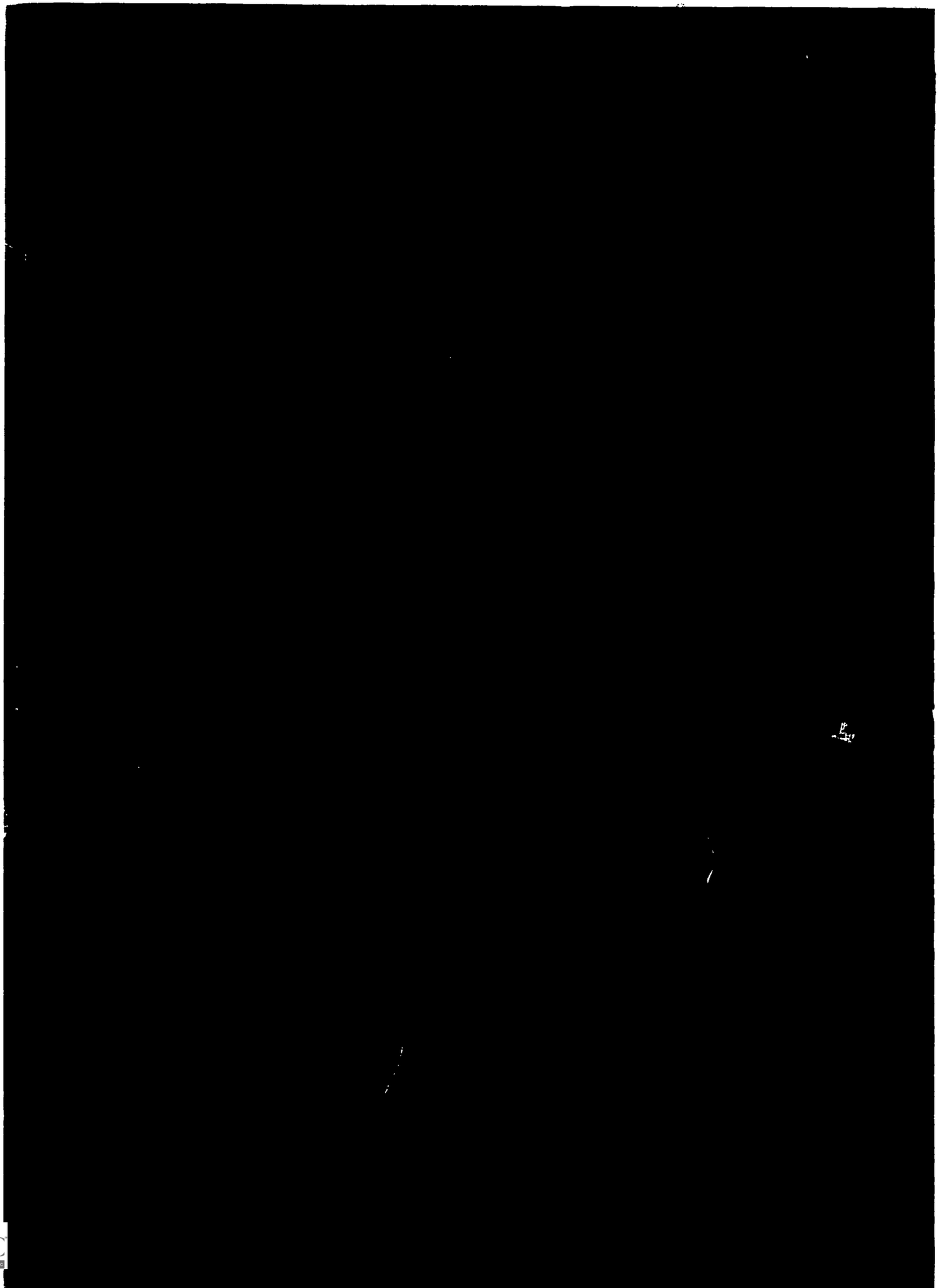


THE BIG EYE









SOCIAL STUDIES RESOURCE UNIT THREE: RESPONSIBLE SOCIAL ACTION TOWARD OUR ENVIRONMENT

INQUIRY QUESTIONS

Inquiry Question: ALL QUESTIONS FOR UNIT THREE			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. PLAY "PEPSI" "Pepsi" is a simulation to cover all the Inquiry Questions of this unit.	A. PLAY "PEPSI" Teacher Comment (TC) # 1, page 219, explains how "Pepsi" is to be played.	A. PLAY "PEPSI" Use appropriate evaluation forms found in Teacher Comment (TC) section.	A. PLAY "PEPSI" 1. This activity may be used exclusively for this Unit. However, additional activities have been suggested. 2. Especially note the Teacher Comments (TC) listed with the additional activities.

Inquiry Question: I. WHAT CONSTITUTES RESPONSIBLE SOCIAL ACTION?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. PLAY "CITIES" "Cities" is a simulation which deals with the idea of responsible social action and urban problems.	A. PLAY "CITIES" 1. "Cities" is not available in this packet. 2. "Cities" may be ordered from the following source: Dyanamic Design Industry, 1433 N. Central Park, Anaheim, California, 92802. 3. "Cities" costs $7.00 for 5 players (individuals or groups).	A. PLAY "CITIES" Evaluate students' ability to interpret rules, participation, and cooperation.	A. PLAY "CITIES" 1. This game is designed to be played by 5 students or 5 groups of students. For the purpose of this learning activity, it would be preferable to divide the class into 5 groups. 2. The game should take 3 class periods. 3. TC #'s 5, 6, 7, 8, 9, 10, and 23, pages 236-246, 275 for back ground on this Inquiry Question.

Inquiry Question: II. WHERE DOES RESPONSIBLE SOCIAL ACTION BEGIN?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. RESEARCH/DISCUSS/REPORT 1. Divide class into small groups to conduct research to answer the following questions (each group select one). 2. "In America, according to law, what is the responsibility to society and the individual of each of the following:" a. federal government? b. state government? c. local government? d. industry? e. business? f. the citizen? 3. Each group delivers its report to the class. Class discussion of report follows. B. WRITE Following reports and discussion, each student should write an essay answering - "Where does responsible social action begin?"	A. RESEARCH/DISCUSS/REPORT 1. U.S. Constitution. 2. State Constitution. 3. Local statutes. 4. Guest speakers from local industry, business, and concerned citizens groups. B. WRITE	A. RESEARCH/DISCUSS/REPORT 1. Evaluate depth of research. 2. TC # 3, page 231 3. TC # 2, page 230 B. WRITE Content and form of essay.	A. RESEARCH/DISCUSS/REPORT 1. TC # 5, page 236 should be read again for help on this question. 2. TC # 11, page 247 3. TC # 12, page 248 4. TC # 14, page 251 B. WRITE

Inquiry Question:

III. WHAT NEED IS THERE FOR RESPONSIBLE SOCIAL ACTION?

Learning Activities	Resources	Evaluation	Teacher Suggestions
Activity # 1:			
A. MAKE ARTISTIC PRESENTATION 1. Each student will prepare an artistic presentation which depicts their answer to the Inquiry Question. 2. SC #'s 1 and 2 may be used as examples.	A. MAKE ARTISTIC PRESENTATION SC #'s 1 and 2, pages 209-210	A. MAKE ARTISTIC PRESENTATION 1. Thought and effort in completion of project. 2. Committee of impartial judges may award Ecology Eyeball. (See Unit II, Teacher Suggestions, page 103.)	A. MAKE ARTISTIC PRESENTATION 1. Most students will have an opinion on this question without having developed it to a great extent. 2. After they have presented their display, have each explain his presentation orally. This will help him to solidify his own views.
B. PRESENT/DISCUSS 1. Have students make an oral explanation as display is presented to class. 2. Allow class to arrive at a conclusion to the Inquiry Question.	B. PRESENT/DISCUSS	B. PRESENT/DISCUSS TC #'s 2 and 3, pages 230-231	B. PRESENT/DISCUSS
Activity # 2:			
A. CONDUCT TREASURE HUNT 1. Each student will collect as many statistics, examples of need, articles, photographs, or any other tangible existence of a need for responsible social action in a given time (weekend).	A. CONDUCT TREASURE HUNT	A. CONDUCT TREASURE HUNT Suggested Ecology Eyeball awards (Unit II, Teacher Suggestions, page 103): a. most examples b. most variety c. most unusual	A. CONDUCT TREASURE HUNT Teacher should suggest periodicals, books, local industrial and business reports and house organs, newspaper files, and local environmental agencies where information and statistics may be found.

Inquiry Question: III. WHAT NEED IS THERE FOR RESPONSIBLE SOCIAL ACTION?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
2. Class will compile information and statistics acquired and formulate a class report of world, national, and local need that exists.		d. best international example e. best national example f. best local example.	
Activity # 3:			
A. INVITE GUEST SPEAKERS 1. Students will determine which people in their locality could best provide them with a variety of opinions on the Inquiry Question. 2. Students will then form committees (one for each speaker selected) and follow all procedures for inviting that person to speak in class.	A. INVITE GUEST SPEAKERS	A. INVITE GUEST SPEAKERS Proper completion of invitation procedures.	A. INVITE GUEST SPEAKERS TC # 14, page 251
B. DISCUSS Following guest's presentation, have class discuss the value and need for responsible social action in the area represented by guest speaker.	B. DISCUSS	B. DISCUSS TC # 2, page 230	B. DISCUSS

Inquiry Question: IV. WHAT ARE SOME CRITICAL AREAS FOR RESPONSIBLE SOCIAL ACTION? (AIR, WATER, POPULATION, ETC.)			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. RESEARCH 1. Have class identify a list of problems commonly associated with the three general environmental areas - air - water - land. 2. Divide class into small groups and allow them to select one item from the list to research. 3. Groups' written research paper should include the following: a. the existing problem b. suggested solutions c. attempted solutions d. problems resulting from action or lack of action e. impediments to actions, both proposed and attempted f. students' thoughts and suggestions about the problem.	A. RESEARCH Public, school, and home libraries.	A. RESEARCH 1. TC # 20, page 270 2. TC #'s 26, 27, 28, and 29, pages 279-282	A. RESEARCH TC # 15, page 254
B. REPORT 1. Each group will give an oral presentation to the class. 2. Each group will select and prepare a method of presentation. (Panel, skits, guest speakers, poetic, visual, or musical offerings, etc.)	B. REPORT	B. REPORT TC # 3, page 231	B. REPORT

Inquiry Question:	IV. WHAT ARE SOME CRITICAL AREAS FOR RESPONSIBLE SOCIAL ACTION? (AIR, WATER, POPULATION, ETC.)		
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
C. DISCUSS Class should discuss each report and arrive at a conclusion to the Inquiry Question. Activity # 2:	C. DISCUSS	C. DISCUSS TC # 20, page 270	C. DISCUSS
A. PLAY CASSETTE/DISCUSS 1. Play cassette "Shoulder to Shoulder". 2. Discuss cassette briefly with intentions of leading into simulation activity.	A. PLAY CASSETTE/ DISCUSS 1. Cassette tape, "Shoulder to Shoulder" can be borrowed from C.E.E. 2. Cassette player must be obtained from own school.	A. PLAY CASSETTE/ DISCUSS TC # 2, page 230	A. PLAY CASSETTE/ DISCUSS 1. This cassette tape can be purchased from the following: The Center for Cassette Studies, 8110 Webb Avenue, North Hollywood, California 91605. 2. TC # 16, page 259
B. PLAY "POP-BOOM" 1. Overpopulate an area of your classroom. Prearrange a reasonable number of chairs for an overpopulated activity. 2. Place a number of small groups in the overpopulated area. 3. Require the groups to complete a project which, by competing for materials, will exhaust the limited resources supplied. 4. Tape record area for comments which will result from competition for materials as results of	B. PLAY "POP-BOOM" 1. Have glue, scissors, pictures, posterboard, rulers, etc. ready. 2. Tape recorder needed.	B. PLAY "POP-BOOM" Tape recording will be replayed to point out conflict caused by overpopulation. Students should recognize own voice and response in the conflict.	B. PLAY "POP-BOOM" 1. This is a mock assignment to demonstrate the effects of growing populations on limited resources. 2. Do not announce overpopulation project to class. Surprise is an element which will add enjoyment to the activity. 3. Try to conceal tape recorder so students will be unaware that their remarks are being recorded.

Inquiry Question: IV. WHAT ARE SOME CRITICAL AREAS FOR RESPONSIBLE SOCIAL ACTION? (AIR, WATER, POPULATION, ETC.)			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
overpopulation. C. DISCUSS 1. Replay selected segments of tape for class. 2. Discuss the following questions: - what was the purpose of the project? - how does it relate to the Inquiry Question. - what action could be taken to alleviate the problem.	C. DISCUSS	C. DISCUSS TC # 2, page 230	C. DISCUSS

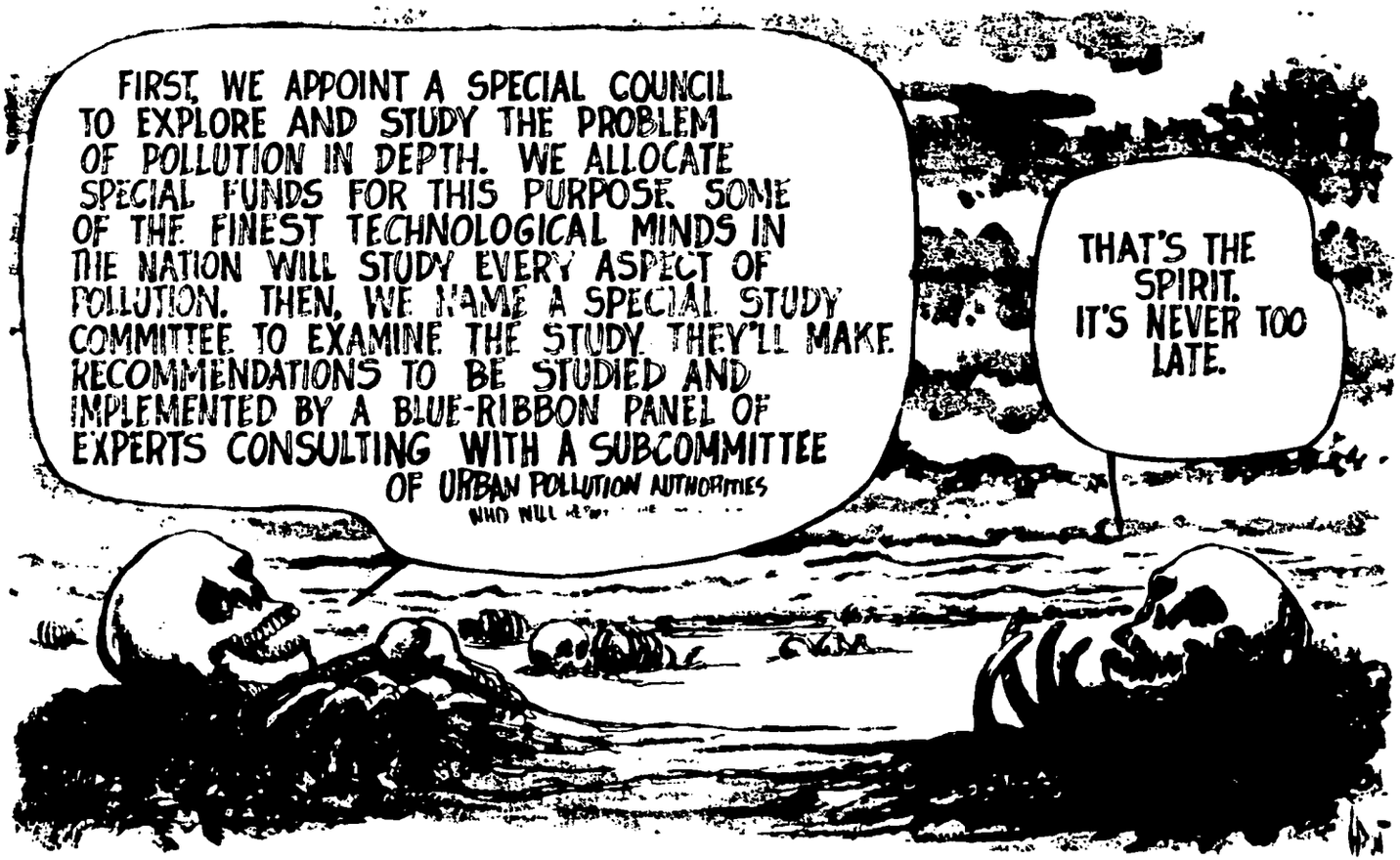
Inquiry Question: V. WHAT IMPEDES RESPONSIBLE SOCIAL ACTION (SOCIETY, GOVERNMENT, RELIGION, INDUSTRY)?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. COLLECT/WRITE 1. Have students locate news articles that demonstrate the impediments to responsible social action. (SC #'s 3 and 4 for samples) 2. Find articles that discuss social groups, governmental agencies, religious organizations, industrial groups and editorial writers that impede the solving of environmental problems. 3. Mount articles and/or write brief summary.	A. COLLECT/WRITE 1. School, home or public libraries 2. SC #'s 3 and 4, pages 211-212	A. COLLECT/WRITE 1. TC # 2, page 230 2. Articles collected by students.	A. COLLECT/WRITE 1. Assist students to find articles in the Readers Guide to Periodical Literature that would help to answer questions. 2. TC #'s 17 and 24, pages 261 and 276.
B. REPORT Students present their articles to class orally.	B. REPORT	B. REPORT TC # 3, page 231	B. REPORT
C. DISCUSS/LIST 1. After articles have been collected, have class discuss various ones read. 2. Arrive at conclusion to the Inquiry Question and list on board.	C. DISCUSS/LIST	C. DISCUSS/LIST TC # 2, page 230	C. DISCUSS/LIST

Inquiry Question: VI. WHO IS RESPONSIBLE FOR TAKING RESPONSIBLE SOCIAL ACTION?			
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. DISCUSS Have class discuss each of the following questions: 1. To solve environmental problems what can each of the following do ALONE without help and cooperation of the others mentioned: government industry business concerned citizen groups concerned individuals 2. What would be the advantages to each of the above if solutions to environmental problems were found? 3. In what ways could solution endanger the vested interests of each of the above? 4. Who, then, should have the responsibility to determine what action constitutes "responsible" social action?	A. DISCUSS	A. DISCUSS TC # 2, page 230	A. DISCUSS 1. Help students to determine the extent of the power of each group with gentle reminders if needed. Be prepared to determine if the student attributes excessive power to any group without being corrected by another student. 2. TC # 18, page 266, may be used as a springboard into students' DISCUSS activity.

Inquiry Question:	VII. WHAT IS THE PRESENT STATUS AND WHAT IS THE FUTURE PROJECTION FOR RESPONSIBLE SOCIAL ACTION?		
Learning Activities	**Resources**	**Evaluation**	**Teacher Suggestions**
Activity # 1: A. READ/DISCUSS 1. Have students read SC articles. 2. Discuss as a class the answers to these questions: a. What are some reasons environmental problems can not be solved? b. What solutions have been established in these articles? c. Do you think the solutions have been responsible?	A. READ/DISCUSS SC #'s 5, 6, and 7, pages 213-215	A. READ/DISCUSS TC # 2, page 230	A. READ/DISCUSS 1. Find other news articles that are pertinent to your locale. Develop questions from material located. 2. TC # 4, page 232 for Teacher Background. 3. TC #'s 19, 20, 21, 22, and 25, pages 267-74, 278 may be presented to students also.
B. SHOW/CREATE 1. Show cartoon as example. 2. Have students react to cartoon. 3. Have students make similar cartoons.	B. SHOW/CREATE 1. SC # 8, page 216 2. Opaque and overhead projectors.	B. SHOW/CREATE Collect and evaluate cartoons. (TC # 30, page 283)	B. SHOW/CREATE 1. Make a transparency of cartoon or a similar cartoon. Use overhead projector. 2. Opaque projector to be used for students to display their cartoons.
C. PRESENT/REACT 1. Allow students to display their cartoons and explain them. 2. Elicit remarks from other students regarding the displayed works and a class conclusion for the Inquiry Question.	C. PRESENT/REACT	C. PRESENT/REACT 1. TC # 3, page 231 2. TC # 2, page 230	C. PRESENT/REACT

STUDENT COMMENTS

STUDENT COMMENT NO. 1



Don Wright, The Miami News

'That's the Problem . . . Even the Ecologists Are Squeezing the Charmin'

Tom Darcy, Today

'The Sky Is Falling'

People tend to believe a Ralph Nader or a Bob Hope, but to disbelieve. or at least doubt, a Lyndon Johnson or a Richard Nixon. The term "credibility gap" has been widely applied to this stituation.

Up to now, most environmentalists have enjoyed a Nader-like believability with the average citizen. There's not been a feeling of any credibility gap. Even when these people were guilty of some over-statements about the peril of some project or exaggerated the level of pollution present in a certain place, they were granted this license — because any error would be to the public's advantage anyway — right?

But now there are a growing number of people who aren't willing to extend this privilege to the environmentalists, "ecology freaks," as some would frankly call them. And the reason for this budding credibility gap is that there have been a number of unsatisfactory answers to questions. A few examples:

● Phospates in detergents. Are they really undesirable because of water pollution, or are they a better choice then the substitutes that have been developed. Perhaps we should leave them in detergents and modify the treatment plants to remove them from waste water.

● The pesticide DDT. Just when most people are convinced the world would be better off without it, along comes a responsible scientist to scoff at this. Dr. Norman E. Borlaug, father of agriculture's Green Revolution and last year's Nobel laureate, says that the world "will be doomed not by chemical poisoning, but from starvation." He says that the price of agricultural products would soon skyrocket if DDT is totally banned from use.

● The Amchitka hydrogen bomb test. The environmentalists who predicted certain tragedy from this government-controlled test now look foolish. There were no earthquakes, no tidal waves and no radiation poisoning of the atmosphere.

● Mercury in fish. We are told that mercury in fish is poison. But there are no specific guidelines as to how much constitutes a health hazard. Fish have had mercury in them for many, many years.

● Pollution of the Indian River. Some researchers tell us that the Indian River is "dying" because of water pollution. But the head man with the county health department's water quality control office tells us the Indian River has excellent water quality — "better than it was 10 years ago."

We could go on with a much longer list — Would the Cross Florida Barge Canal really have damaged Florida's water supply ... Would the Super-Sonic Transport plane (SST) really have brought downfall to the world by creating clouds and changing the earth's temperature? ... The proof is lacking.

Our point is simply this, environmentalists are going to have to start bearing a heavier burden of proof in their cases, else they become shrugged off like the fanatics who are always predicting the end of the world.

STUDENT COMMENT NO. 4

Phosphate Facts

The official turnabout on the question of phosphates in detergents provides some useful insight into the continuing debate over pollution.

That phosphates were a bad thing, to be eliminated from detergents as rapidly as possible, was one of the items that was supposedly "known" about pollution, and it was on the basis of this asserted knowledge that the Indiana Legislature moved to prohibit the use of phosphate detergents in our state.

Now, according to a joint statement by the Council on Environmental Quality, the Department of Health, Education and Welfare, and the Environmental Protection Agency, this action doesn't seem quite so knowledgeable. These agencies say that caustic substitutes for phosphates in detergents pose serious health hazards, in some cases possibly causing cancer.

The agencies further state that "certain of the non-phosphate detergents now on the market contain ingredients that, if accidentally ingested, aspirated, or introduced into the eyes, may be extremely injurious to humans, particularly to children. These particular products utilize materials as a substitute for phosphates that are highly caustic and that clearly constitute a health hazard, which phosphates do not."

On the basis of these and other findings, it appears that stringent anti-phosphate laws may be counterproductive in terms of health and pollution efforts alike.

The agencies say that "in view of the unacceptable health risks of many phosphate substitutes and the plan for reducing phosphates in municipal wastes, states and their political subdivisions should reconsider policies that unduly restrict the use of phosphates in laundry detergents."

Here as in other cases we do not suggest that what these spokesmen say on detergents is the last word on the subject; it may be that further research will point the way to a perfectly good and safe substitute for phosphates which can be put into general use, and further knowledge up and down the line about the health effects of all kinds of substances employed in daily life is always a desirable commodity.

The phosphate episode does suggest, however, the unwisdom of "do something" agitation which demands instant action in the name of combatting pollution. Instant action without sufficient knowledge is all too often the wrong action.

— Indianapolis News

STUDENT COMMENT NO. 5

Mother Nature Fights Back

Paul Harvey

"It's not nice to fool Mother Nature!"

She has some tricks up her own sleeve. She fights back.

Dr. Stanley Cain of the University of Michigan is an expert on environment.

And this expert says the biggest deterrent to solving environmental problems is "too many experts."

And he said that to an audience of acknowledged "experts," to the Conservation Education Assn.

He believes that government and industry are ready, willing and able to do what's best, but how are they to know what's best when the experts can't agree?

Thus there is a very real danger that necessary innovations will be held in limbo and the the public will become anesthetized to all warnings.

These now-you-can, now-you-can't, yes-you-can edicts from Washington are devastatingly costly and tend to discredit the whole ecological rescue mission.

The Federal Soil Conservation Service used to be the idol of most conservationists, but yesterday's "hero" is today's "villain."

Now the waterway modification known as "stream channelization" is deplored by wildlife and conservation officials.

The FSCS claims it facilitates navigation, alleviates flooding and improves agricultural drainage. The critics insist it devastates our waterways, destroys topsoil and degrades irreplaceable natural resources.

While the finite minds of men grapple with these contradictions, fortunately for us Mother Nature is fighting an effective rear-guard action on many fronts.

There appears to be an instinct for self-preservation even among the inanimates.

There is apparent in nature a phenomenal facility for the natural healing of hurts.

That's not all: The ivory-billed woodpecker, feared extinct, is reproducing in South Carolina.

Spanish moss, dying from fungus, is overcoming that blight.

Alligators, an "endangered species," are proliferating.

And the Thames Estuary in England, barren of bird life for 30 years, abounds with birds again.

It was just weeks ago that TV specials were lamenting the plight of the coral reefs of the Pacific. Starfish were "eating them up."

Proliferating starfish were likened to a "crown of thorns," destroying the ecological balance of the Pacific Ocean.

Headlines called it "an ecological crisis."

They're gone.

The starfish are gone. Just like that, the overabundance of starfish is no more.

No, Congress didn't do it.

Congress quick-voted $5 million — the politicians' classic response to any crisis, real or imaginary — but before the money could be spent . . .

And while ecological crusaders were mobilizing to converge on the reefs to wage war with their bare hands if need be . . .

And while foundations launched elaborate studies of the cause and cure, considering everything from DDT to dredging new canals . . .

Before any of these proposed remedial measures could be tried, the starfish population went into decline.

The experts agree on this: They don't know why.

STUDENT COMMENT NO. 6

New Forests—Quicker

You've heard of breakfast cereals "shot from guns" — but trees!

In one of the rare examples of man replacing machines, foresters in Georgia-Pacific's tree farms are literally shooting new trees out of guns.

The machine in this case is the helicopter, once hailed as the most effective way to reseed harvested forest land on a mass scale. The gun is a special "inertia" gun, which does an even better job.

Instead of seeds, the gun fires two-inch seedlings encapsulated in fertilized "bullets" into the ground. One man on foot can plant up to 2,500 trees a day.

The new method permits transplanting of vigorous seedlings from nursery stock and allows more natural spacing. It also eliminates losses of seeds to birds or the need to treat them against rodents.

With better trees, low mortality and a head start, it is believed that the growth cycle may be reduced from the present 40 years to 35. In the face of this country's increasing consumption of trees and tree products, that's good news.

STUDENT COMMENT NO. 7

Now, Which Gasoline?

Now that the government has backtracked in the case of phosphate detergents, will it do the same with leaded gasoline?

Evidence is accumulating that bad as lead may be (we really don't know), in some respects nonleaded or low-leaded gasolines may be worse, especially in their smog-producing capabilities.

Despite hustle and ballyhoo by both the petroleum and automotive industries and the blessings of environmentalists, motorists have not rushed out to buy the stuff, and not just because of the higher price. They are worried by claims that nonleaded fuels can cause damage to engines not specifically built to run on them.

Chances are, however, that by the time anyone gets around to proving the environmental harm, or lack of it, of leaded vs. unleaded gasoline, the nation will have too big an investment in low-pollution engines designed to run on leadless gas to be able to turn around. By the end of the 1972 model year, some 20 percent of cars on the road will be engineered to use these fuels.

STUDENT COMMENT NO. 8

PEPPER.... *and Salt*

"We have an ecological problem of how to get rid of all these books on ecology!"

TEACHER COMMENTS

TEACHER COMMENT NO. 1 : P.E.P.S.I.
(Possible Environmental Problem Solution Index)

SCOPE: PEPSI is a simulation designed to develop an awareness in the participants of the complex social ramifications of environmental problems and the economic, legal, political, social difficulties inherent in trying to determine and implement practical solutions to these problems within the framework of our free society where individual interests must be protected and each citizen has a voice in government.

This simulation does not provide solutions. It merely presents specific environmental problems and provides each participant with a specific identity of a member of their community so that he can look at that problem through the eyes of an adult citizen who is capable of assuming full responsibility if he sees a need, and who will be affected by any solution or lack of solution. There is no "winner" or "loser" in this game. Every participant "WINS" by increasing his awareness of the ecological problems of his community, the proposed, planned, and attempted solutions to these problems, and the impediments to ecologically sound solutions, justifiable or unjustifiable. Anyone who becomes more aware of the practical complexity of American society and an appreciation of the myriad of considerations involved in the interaction of the problems of society, cannot be a "loser".

OBJECTIVE: The objective of "PEPSI" is to develop practical solutions to real environmental problems. These solutions should be agreeable to either all participants or to whatever percentage of participants the total players determine as proper. Any solution reached must be legally, economically, and socially acceptable and possible to implement. Participants should be aware that they may not always achieve a solution to a problem. In such an eventuality they should, however, understand why the solution was not possible, and offer practical, workable suggestions for changes which would make a solution possible.

INSTRUCTIONS:

(1) Each participant is to select a "PEPSI ROLE CARD". Throughout the simulation the participant is to approach the problems propounded from the viewpoint of the role selected. The participant should become as knowledgeable as possible about the work, hobbies, attitudes, special interests, etc., of the role he is playing. If time permits, the participant may wish to interview a member of his community who closely parallels his role.

NOTE: If roles provided are inadequate for your particular area or circumstances you may wish to substitute your own roles or modify roles provided.

(2) Select from ONE to FOUR "PEPSI CARDS". Each of these cards contains a specific environmental problem and, also, includes an example of a solution which is commonly proposed or used in America. The number of cards selected should depend on the age level of the participants and the amount of time allocated for playing the game.

The card (s) selected will be the sole environmental problems with which the participants will concern themselves. Each participant should:

a. determine if this problem exists locally, and, if so, to what extent.

b. study the proposed, planned and attempted solutions to this problem locally; failures, successes, and agruments pro and con.

c. consider the benefits, problems, significance, etc., of the problem (s) and present proposed, planned or implemented solutions to the individual whose role has been assumed.

d. decide why the "role" would or should take any action, and, if so, what that action should be. (i.e. support or oppose proposed solution; seek better solution.)

(3) Once participants have become knowledgeable of the local situations and have reached a general conclusion as to their position towards each problem presented, they should make their position known

to other players in whatever way would be most practical for a person in their role. Each should seek the support of those with views similar to his or those who he believes may be convinced to assist him.

(4) Meetings should be held with those in opposition, various viewpoints aired, compromise solutions attempted. Each participant should assiduously look after the legal, economic, and social interests of the individual whose role he has assumed.

(5) The PEPSI EVALUATION SHEET should be provided to each player. On this sheet he should keep track of his major movements, views, etc. (more than one sheet may be necessary). If more than one "PEPSI CARD" problem is being considered, players must keep in mind that each requires a specific solution.

(6) Simulation concluded either at end of a specified period of play or when players either reach solutions or concede that solution is not possible.

Please remember that any solution must be economically, legally PRACTICAL both in content and implementation. Both short-range and long-range ramifications should be considered. Participants are encouraged to give full play to their imaginations, be innovative and original. Planning, initiative, determination, and open-mindedness may aid in achieving desired results.

PEPSI ROLE HOUSEWIFE Statistics: 28 yrs.old; Married; 2 Children; Does not work; Husband (Teacher) earns $8,500 per year. Girl Scout Den Mother.	PEPSI ROLE SUPER MARKET MANAGER Statistics: 45 yrs.old; Married 3 Children; Income -$16,000 Member :Izaak Walton League, VFW, Sponsors Little League.	PEPSI ROLE MAYOR Statistics: 55 yrs.old; Attorney Salary $22,000 City Population 25,000 Main Industry -Shoe Factory 300 employees; Paper Mill 120 employees.
PEPSI ROLE CITY MANAGER Statistics: Professional (degreed) 32 yrs. old; Black Salary $20,000 Industry :Tire Factory 525 employees; Small Components Shop; USAF Base on outskirts. NOTE: Sister city to "MAYOR" city.	PEPSI ROLE WELFARE MOTHER Statistics: 22 yrs.old; 3 Children; Unwed; On Welfare/ACD; lives in Federal Housing Project. (Check local sources for amount of income) NOTE: works part time as domestic.	PEPSI ROLE RETIRED CORPORATE EXECUTIVE Statistics: Retirement income $25,000; 57 yrs.old; owns home; 2 cars; yacht (55 ft.). Member: Yacht Club; Mayor's Advisory Council on Civic Improvements
PEPSI ROLE OLD LADY ON SOCIAL SECURITY Statistics: 72 yrs.old; Failing health; No family locally; Social Security Survivor Benefits; Small, paid for home; Taxes $325; Cannot drive; Member: Church Ladies Society.	PEPSI ROLE FACTORY WORKER Statistics: Shop Steward -UAW/CIO; Income $12,500 &overtime; Home owner; wife; 3 Children; Bowling League; Member: VFW; 39 yrs.old; 20 years at same factory.	PEPSI ROLE N.A.A.C.P. REPRESENTATIVE Statistics: Professional Mortician; Owns Funeral Parlor. Acting County Coroner. 47 yrs.old; Married; 2 Children; 3 Grandchildren; Member: VFW.

PEPSI ROLE SCHOOL TEACHER Statistics: 24 yrs.old; Unmarried; Salary $7,300. Member: Jaycees; Civitans, A.R.A. (American Riflemans Association)	PEPSI ROLE WATER TREATMENT PLANT OPERATOR Statistics: M.A. in Chemistry; 53 yrs. old; Married; 5 Children; 12 Grandchildren; Member: U.S. Chemists Association.	PEPSI ROLE FARMER Statistics: 38 yrs.old; Married; 14 Children; 240 Acres -truck & dairy farm. Graduate - Florida Agriculture College; Local Grange Representative Member: 4H Club Leader.
PEPSI ROLE UNION OFFICIAL Statistics: 41 yrs.old; Naturalized Citizen; Member: International Longshoreman's Union. Membership: Yacht Club; Country Club; Mayor's Council on Civic Improvements.	PEPSI ROLE UNEMPLOYED LABORER Statistics: 20 yrs.old; Married; 1 Child; Wife not working; Out of work 8 weeks (Unemployment Compensation) Renting Apartment; Skills: 2 years High School, worked as laborer.	PEPSI ROLE VETERINARIAN Statistics: Owns Animal Clinic; Acting County Veterinarian; 34 yrs. old; Member: Panhellenic Society; League of Women Voters, Country Club.
PEPSI ROLE EDITOR -HIGH SCHOOL NEWS Statistics: 17 yrs.old; Senior; Father -Insurance Salesman; Mother -Housewife/ Grey Lady. Membership: Quill & Scroll; Candystriper.	PEPSI ROLE CONSTRUCTION WORKER Statistics: 29 yrs.old; Union Member; 3 Children; Crane Operator; Income $200 weekly; Membership: None.	PEPSI ROLE ATTORNEY Statistics: 36 yrs.old; General Practice Criminal-Civil; Married; 2 Children; Income $24,000; Volunteer work with Legal Aid Society.

PEPSI ROLE CITY CIVIL SERVICE EMPLOYEE Statistics: 51 yrs.old; personnel dept. manager; married; 3 married children; 8 grandchildren. Membership: Alcoholics Anonymous; Volunteer Ambulance Driver; Vice-President Homeowners Association.	PEPSI ROLE REAL ESTATE AGENT Statistics: 48 yrs.old, married, 3 daughters in high school, has own agency, handles commercial & residential listings, hires 5 agents. Membership: Country Club; Yacht Club; Kiwanis; Jr. Chamber of Commerce; Realtors Assn.; N.A.A.C.P.; Izaak Walton League.	PEPSI ROLE INSURANCE AGENT Statistics: 45 yrs. old, married, 1 son in prison-(1 yr. possession of marijuana), owns general agency fire, auto, life, 3 employees, income $22,000. Membership: Jr. Chamber of Commerce, Independent Insurance Agents Organization, Sports Pilots Assn. A.R.A.
PEPSI ROLE CREDIT LOAN COMPANY BRANCH MANAGER Statistics: 26 yrs. old, single, B.A. Business Management, Army veteran (Vietnam-1st Lt.) National Loan Company, supervises 5 employees, income $9,200. Membership: Classic M.G. Club, Scuba Diving Club, Playboy Club, Toastmasters Club.	PEPSI ROLE BANKER Statistics: 2nd Vice-President -full service bank, 40 yrs. old, married, 1 married daughter, income $19,500 & investment income. Membership: President's Advisory Council on Urban Renewal; U.S. Navy Reserve (Captain); Mayor's Council on Narcotics and Youth; Member-state parole board.	PEPSI ROLE AUTO DEALER Statistics: owns own dealership -new & used cars, sales, service, body shop, 28 employees, 34 yrs.old, married 8 children (3-11), sponsors late show on TV. Membership: Stock Car Racer's Assn., Local Parachutist Club; Jr. Chamber of Commerce, Rotary.

PEPSI ROLE ELECTRONIC ENGINEER Statistics: 38 yrs. old, married, 4 children, employed by NASA as Design Engineer, income $18,500. Membership: Sierra Club; Model Airplane Club.	PEPSI ROLE OCEANOGRAPHER Statistics: 31 yrs. old, married, no children, wife -chemist -same employer, research specialist in underwater farming. Employed by State University under federal research grant. Membership: National Oceanographic Institute, Scuba Instructor for YMCA, Local "Rap House" counselor.	PEPSI ROLE NEWSPAPER REPORTER Statistics: 45 yrs. old, married, 6 children, (3 married -3 teenagers), USMC veteran (Korea), 19 years on local paper, chooses to work city desk. Membership: Mayor's Advisory Council on Crime; Half-way House Counselor.
PEPSI ROLE BARBER Statistics: 39 yrs. old, owns 3 chair shop, employs 2 barbers , married, 1 child. Membership: Jr. Chamber of Commerce, VFW, Kiwanis.	PEPSI ROLE TRUCK DRIVER Statistics: Works for soft drink company, delivery work in city, 26 yrs. old, married, 2 children, wife not employed, no military service. Membership: Teamsters Union, Church Choir.	PEPSI ROLE NURSE Statistics: Works in nursing home for aged, night shift, 43 yrs. old, married, 2 married sons, husband -POW in Vietnam since 1967. Membership: POW Wives.

PEPSI ROLE DOCTOR OF MEDICINE (eye, ear, nose & throat) Statistics: 54 yrs.old, widow, 4 married children. Practice restricted to speciality, Income (undetermined), volunteer work -Public Health Clinic. Membership: A.M.A., Country Club, Local Bicycle Enthusiasts Club.	PEPSI ROLE POLICE OFFICER Statistics: 29 yrs. old, divorcee, no children, assigned to motor partol general duty, rotating shifts, attends law school part time. Membership: U.S. Marine Corps League, Police Department Motorcycle Drill Team, Boys Club Counselor.	PEPSI ROLE FIREMAN Statistics: 31 yrs.old, married, 8 yr old son, rotating shift, part time accounting student, wife not employed. Membership: Sierra Club, National Guard (Sergeant).
PEPSI ROLE CITY COUNCIL MEMBER (Elected) 4 year term Statistics: 36 yrs. old, divorcee, 17 yr. old daughter (high school student), former school teacher. Membership: President, High School P.T.A.	PEPSI ROLE FACTORY WORKER Statistics: 22 yrs. old, married, no military, 3 yrs. high school, 2 children, wife -insurance office clerk., machine operator $2.65 per hour. Membership: company bowling league.	PEPSI ROLE CARPENTER Statistics: Journeyman, 38 yrs. old, married, 2 children, wife unemployed, income $14,000, employed by construction contractor. Membership: A.F.L., U.S. Navy Reserve (Lieutenant).

PEPSI CARDS

PEPSI General Problem: AIR POLLUTION Specific Problem: POWER PLANTS Solution: NUCLEAR POWER PLANTS	PEPSI General Problem: WATER POLLUTION Specific Problem: PAPER MILL Solution: PAPER MILL TREATMENT OF EFFLUENTS	PEPSI General Problem: POPULATION Specific Problem: DENSITY Solution: URBAN RENEWAL PROJECT
PEPSI General Problem: ATMOSPHERIC POLLUTION Specific Problem: NUCLEAR TESTING Solution: STOP NUCLEAR TESTING	PEPSI General Problem: WATER POLLUTION Specific Problem: SEWAGE DISPOSAL Solution: 80% SEWAGE TREATMENT (20% RETURNED RAW)	PEPSI General Problem: NOISE POLLUTION Specific Problem: JET AIRCRAFT ENGINE NOISE (TAKEOFF/LANDING) Solution: AIRCRAFT NOISE ABATEMENT (50% POWER LEVEL ON TAKE-OFF/LANDING)
PEPSI General Problem: NOISE POLLUTION Specific Problem: DECIBEL LEVEL OF MODERN MUSIC Solution: LOCAL LAWS RESTRICTING DECIBEL LEVEL	PEPSI General Problem: AIR POLLUTION Specific Problem: AUTO EXHAUST Solution: CATALYTIC CONVERTERS	PEPSI General Problem: WATER POLLUTION Specific Problem: INDUSTRIAL EFFLUENTS Solution: RELOCATE FACTORY

PEPSI General Problem: WATER POLLUTION Specific Problem: OIL SPILLS Solution: CLEAN UP BEACHES	**PEPSI** General Problem: AIR POLLUTION Specific Problem: RESPIRATORY DISEASES Solution: RELOCATE PEOPLE and/or INDUSTRY	**PEPSI** General Problem: AIR POLLUTION Specific Problem: AUTO EXHAUST EMMISSION Solution: NON-LEADED FUEL
PEPSI General Problem: LAND POLLUTION Specific Problem: STRIP MINING Solution: LAND RECLAMATION	**PEPSI** General Problem: FOOD POLLUTION Specific Problem: SPOILAGE Solution : ADDITIVES & PRESERVATIVES	**PEPSI** General Problem: WATER POLLUTION Specific Problem: BRIDGE CONSTRUCTION Solution: NEED NOT YET ESTABLISHED
PEPSI General Problem: AIR POLLUTION Specific Problem: AUTOMOBILE Solution: PUBLIC TRANSPORTATION	**PEPSI** General Problem: POPULATION Specific Problem: OVERPOPULATION Solution: RATIONING OF BASIC NEEDS	**PEPSI** General Problem: LAND/WATER/AIR POLLUTION Specific Problem: USE OF INSECTICIDES Solution: BAN USE OF INSECTICIDES

PEPSI EVALUATION SHEET

Name _____ Role Played _____

Period Number _____ Date _____ Score _____

Problem _____

PROCEDURES FOLLOWED	HOW PROBLEM EFFECTS YOUR ROLE	ROLE RESPONSIBILITY

COOPERATING ROLE PLAYERS OR GROUPS (HOW? WHY?)	IMPEDING ROLE PLAYERS OR GROUPS (HOW? WHY?)

ROLE SOLUTION:

CONCLUSIONS/FINAL RESULTS/COMMENTS:

TEACHER COMMENT NO. 2 : Participation Evaluation

The following checklist is offered as an example of a device which may be used to lend a degree of objectivity to evaluating student participation in class discussions. The teacher may involve students in the evaluative process by devising a rotation system whereby two or three students would evaluate class members during class discussion periods.

Only four simple catagories are employed in this checklist. More complex scaling may be included if the teacher wishes to discriminate among cognitive skills of the students, (i. e. recall, synthesis, analysis, etc.). However, this type of scale is not easily employed. The following catagories for evaluation are included in this suggested checklist:

1. Quantity of student contribution.
2. Content of student's remarks as these indicate knowledge of topic, critical and/or innovative thinking by student.
3. Relevance of student's remarks to subject under consideration.
4. Clarity of expression and presentation by student.

The evaluator may indicate quantity of student's remarks by simply placing a check in the appropriate column. The other categories should be rated on the following qualitative scale of 1-4.

1 - Poor (incorrect and/or inappropriate)
2 - Fair
3 - Good
4 - Excellent (complete and appropriate)

The following chart may be adapted for use in the evaluation described above. Simply record student's name when he initially participates and continue evaluation of any of his subsequent comments on same line. There is no need to record the student's name until the point of initial contribution.

NAME	QUANTITY	CONTENT	RELEVANCE	CLARITY
1. Sam Sunshine		3, 1, 2	4, 1, 3	3, 3, 3
2.				
3.				

TEACHER COMMENT NO. 3 : Evaluation Form For Oral Report
(To be filled in by students and/or teacher)

Subject of Report _____ Student reporting _____

I. Knowledge of subject matter and/or what way questions were answered.

_____a. Excellent (5 points) _____b. Good (4 points) _____c. Fair (3 points)
_____d. Poor (1 point) Points Earned _____

II. Presentation of material by using audio/visual aids. Evaluate each aid used from 0--5 points.

_____a. Charts _____b. Maps _____c. Graphs
_____d. Guest Speaker _____e. Slides _____f. Films
_____g. Filmstrips _____h. Table Display _____i. Study Guides
_____j. Puzzles/Games _____k. Skits _____l. Other
Points Earned _____

III. Equipment used in presentation. Evaluate each aid used from 0--5 points.

_____a. Opaque Projector _____b. Filmstrip Projector _____c. Overhead Projector
_____d. Film Projector _____e. Globe _____f. Chalkboard
Points Earned _____

IV. Speaker's attitude towards listeners, tone, and quality of voice should be considered. Evaluate as #1.

_____a. Excellent _____b. Good _____c. Fair
_____d. Poor Points Earned _____

V. Evaluation of the participation of the members of the groups. (Use where applicable)

_____a. Excellent _____b. Good _____c. Fair
_____d. Poor Points Earned _____
Total Points _____

TEACHER COMMENT NO. 4 : Existential Man vs. Economic Growth

"If I were asked to state the great objective which church and state are both demanding for the sake of every man and woman and child in this country, I would say that the great objective is a more abundant life."

Hardly anyone would have been confused by what Franklin D. Roosevelt meant by "a more abundant life" when he made the above declaration in 1933 in a speech before the Federal Council of Churches of Christ. He meant food, shelter, clothing and other forms of material abundance that depression-ridden Americans of the time could no longer take for granted.

Today, the nation's have-nots no doubt still regard material abundance as a primary personal and national goal, and most haves probably do so, too. But the country has come a long way since 1933 and there now are new philosophers who insist that economic growth and abundance should no longer be national objectives.

Wrecking the Environment

They claim that these objectives help account for such worrisome phenomena as youth discontent and social disintegration as reflected in rising rates of divorce, crime and drug misuse. More seriously, they insist we are wrecking our natural and social environment.

Few corporate managers doubt that this challenge should be treated seriously, since the drive for growth and abundance are primary motivators for business corporations. But there are probably a good many who haven't yet fully perceived what the challenge is all about or how best to cope with it.

It is indeed tempting to dismiss anti-growth philosophy as a chimera that will evaporate in the face

of what we have come to regard as the hard realities of existence in the industrial age. Without economic growth, how can there be jobs to employ an expanding population? Is it not true that the discontent with the dominant goals of our society is being voiced and fomented largely by a parasitic population of students and intellectuals who live off the productivity of others and are thus shielded from economic realities?

These are valid questions. But the anti-growth argument is worth examination, because it does prove to have something more than a negative, radical basis. And it does shed some light on conflicts in American society that business and political leaders probably will have to try to cope with in the years ahead.

The most compelling argument against economic growth as a simple ideal is that it is rapidly depleting the world's resources of minerals and fuel through consumption and water and air through pollution.

Economist Herbert W. Robinson, in an address to the World Future Society last spring, predicted that with an annual increase of 2.2% in real output per person in the U.S., our country could, by the year 2000, eliminate poverty and provide a high standard of living and leisure for its citizens.

But such an economy, with a gross national product of $3 trillion, would consume enormous amounts of materials and energy and have waste disposal, air pollution and transportation problems that "stagger the imagination," Mr. Robinson believes. Projecting current growth patterns for the rest of the world, Mr. Robinson doubts that there are adequate resources to support the projected levels of output in 2000.

"We cannot afford not to increase productivity and incomes," Mr. Robinson says. "People now demand it. But can we really survive the consequences of higher productivity and incomes?"

Technology that already is available can solve some of the problems Mr. Robinson projects. A rapid conversion to nuclear fuel from hydrocarbons would relieve some of the combined problems of resource depletion and pollution. Rapid development of nuclear generated electricity also would help cope with problems of food production and transportation, by supplying heat and motive power. Electronic

communications can reduce defoliation and pollution brought about by rising paper usage.

The technical problems of preserving the planet in the face of economic growth do not appear to be unsolvable. Indeed, some futurists, such as England's Fred Hoyle, forsee earthlings multiplying their capacity to produce energy to the point where routine space travel and the mining of the natural resources of other planets will become the answer to resource depletion on earth.

However, the anti-growth argument is more than just technical, and this is the point of real conflict between corporate managers and technocrats on the one hand and many anti-growth critics on the other. Essentially, it is an idealogical argument of a new type. Unless it can be understood and resolved, there is some danger of American society's developing an aimless drift that would render it incapable of setting intelligent policies for the future.

The idealogical anti-growth argument might best be described as an existential argument in that it focuses on the quality of individual human experience rather than on the needs of social and economic organization. In simpler terms, it argues that the growth and abundance ethic is destroying, not improving, the quality of life for individuals in our society.

The Corporate Drop-Out

There are indeed manifestations of an anti-growth backlash that this newspaper and the press generally have been documenting for some years now. One is the corporation drop-out, the able person who is willing to sacrifice his personal prospects for growth--in income, living standard and status (in terms of traditional conventions)--to go search for a new "life style." Another is the so-called youth counter-culture. Raised on a steady diet of televised product advertising spiels generated by growth-minded corporations, many youths, it appears, now seek to reject the materialistic values that were inflicted upon them. So they turn to the hoped-for simplicity of rural communes, the emotional stimulus of encounter

groups or perhaps the mysticism of religion in search of new and better values.

The capacity to reject material abundance--even if it is in many cases only a token rejection made in full knowledge that a return to material comforts is always possible--is truly a mark of an affluent society. But that does not necessarily mean that the idealogy of those who do the rejecting is weak or insupportable, likely to vanish should their own rejection destroy the affluence that supports them.

. . . . Reprinted with permission of The Wall Street Journal.

TEACHER COMMENT NO. 5 : Science and Society

If we are to survive, we need to become aware of the damaging effects of technological innovations, determine their economic and social costs, balance these against the expected benefits, make the facts broadly available to the public, and take the action needed to achieve an acceptable balance of benefits and hazards. Obviously, all this should be done before we become massively commited to a new technology. One of our most urgent needs is to establish within the scientific community some means of estimating and reporting on the expected benefits and hazards of proposed environmental interventions in advance. Such advance consideration could have averted many of our present difficulties with detergents, insecticides, and radioactive contaminants. It could have warned us of the tragic futility of attempting to defend the nation's security by a means that can only lead to the nation's destruction.

We have not yet learned this lesson. Despite our earlier experience with nondegradable detergents, the degradable detergents which replaced them were massively marketed, by joint action of the industry in 1965, without any pilot study of their ecological effects. The phosphates which even the new detergents introduce into surface waters may force their eventual withdrawal. The United States, Great Britain, and France are already committed to costly programs for supersonic transport planes but have thus far failed to produce a comprehensive evaluation of the hazards from sonic boom, from cosmic radioactivity, and from the physiological effects of rapid transport from one time zone to another. The security of every nation in the world remains tied to nuclear armaments, and we continue to evade an open public discussion of the basic question: do we wish to commit the security of nations to a military system which is likely to destroy them?

Despite the dazzling successes of modern technology and the unprecedented power of modern

technology and the unprecedented power of modern military systems, they suffer from a common and catastrophic fault. While providing us with a bountiful supply of food, with great industrial plants, with high-speed transportation, and with military weapons of unprecedented power, they threaten our very survival. Technology has not only built the magnificent material base of modern society, but also confronts us with threats to survival which cannot be corrected unless we solve very grave economic, social, and political problems.

How can we explain this paradox? The answer is, I believe, that our technological society has committed a blunder familiar to us from the nineteenth century, when the dominant industries of the day, especially lumbering and mining were successfully developed--by plundering the earth's natural resources. These industries provided cheap materials for constructing a new industrial society, but they accumulated a huge debt in destroyed and depleted resources, which had to be paid by later generations. The conservation movement was created in the United States to control these greedy assaults on our resources. The same thing is happening today, but now we are stealing from future generations not just their lumber or their coal, but the basic necessities of life: air, water, and soil. A new conservation movement is needed to preserve life itself.

. . . I believe that scientists have a responsibility in relation to the technological uses which are made of scientific developments. In my opinion, the proper duty of the scientist to the social consequence of his work cannot be fulfilled by aloofness or by an approach which arrogates to scientists alone the social and moral judgments which are the right of every citizen. I propose that scientists are now bound by a new duty which adds to and extends their older responsibility for scholarship and teaching. We have the duty to inform, and to inform in keeping with the traditional principles of science, taking into account all relevant data and interpretations. This is an involuntary obligation to society: we have no right to withhold information from our fellow citizens, or to color its meaning with our own social judgments.

The obligation which our technological society forces upon all of us, scientist and citizen alike, is to discover how humanity can survive the new power which science has given it. It is already clear that even our present difficulties demand far-reaching social and political actions. Solution of our pollution problems will drastically affect the economic structure of the automobile industry, the power industry, and agriculture and will require basic changes in urban organization. To remove the threat of nuclear catastrophe we will be forced at last to resolve the pervasive international conflicts that have bloodied nearly every generation with war.

Every major advance in the technological competence of man has enforced revolutionary changes in the economic and political structure of society. The present age of technology is no exception to this rule of history. We already know the enormous benefits it can bestow; we have begun to perceive its frightful threats. The political crisis generated by this knowledge is upon us.

Science can reveal the depth of this crisis, but only social action can resolve it. Science can now serve society by exposing the crisis of modern technology to the judgment of all mankind. Only this judgment can determine whether the knowledge that science has given us shall destroy humanity or advance the welfare of man.

TEACHER COMMENT NO. 6 : Estuaries and Other Habitats

The Atlantic coast of the United States is often made up of low grassy areas which are sometimes covered by the sea and at other times moist mucky land. These are the salt marshes which are home to millions of birds, raccoons, crabs and other creatures. When man enters the picture, the marsh generally becomes the victim of 20th century life and technology. Filling, dredging and pollution caused by sewage and industrial waste all act in man's behalf to destroy the marsh.

Of course some change and loss due to man is inevitable. The very presence of humans means changes in the environment; pest control, roads, boating facilities all have their way of upsetting the balance of the marsh. However, much of the destruction is needless and indeed makes the marsh of less use to man than it was before his invasion when at least the wildlife he hunts and eats had a home in which to breed and grow. Some of the states along the Eastern seaboard have made efforts to protect and regulate these natural habitat areas but their overall effort has been weak and there is such a variety of regulations, it would appear that the real hope of effective management and regulation lies with federal action. This is particularly true in the marshes of the southern states because these states have the bulk of the important marshes and the greatest lack of effective control.

In the not too distant future, most of this coastline will find itself under some form of development. It is imperative that the preservation of a large part of the marshes plays a vital role in the planning for this development. Once again it must be emphasized that the key to this problem is planning.

Probably the most direct method of saving these areas is for public agencies to buy the land, thus making it easy to control what happens on it. This is also a very expensive proposition however and action in this regard has been and will very likely continue to be extremely limited. The application of zoning

laws, restricting the use of the land by the owners has been used in many areas, but often in legal tests the courts have ruled that the regulations are too binding and infringe upon the owners basic rights. One suggested solution to this dilemma is to have local governments buy easements with the right to fill, dredge or build. This would give the owner control over who was on his land and allow him to use it for personal sporting activity but would give the government agency authority over any activity which would change the nature of the marsh.

While the method used may very from place to place, one thing is clear--care must be taken to protect the land against the rising pressure to develop the land for other uses due to a growing population. Often this pressure comes from local industries who threaten to move unless certain lands are made available for their expansion or modernization. This type of pressure hits directly at the incomes of the local residents and is very difficult to resist. Sometimes state government people are involved in creating the pressures by their efforts to encourage new industry to locate in their state.

Time and time again, our national government has acted to save specific places or areas and in many cases has done so quite effectively. This is, however, a problem of wider magnitude, for the salt marshes cover the entire Atlantic coast, involving several states and many different local situations. Let us hope that as a nation we are up to the task.

TEACHER COMMENT NO. 7 : Utilities Fail Responsibility

Utility company officials have described a report by the Council on Economic Priorities as a "hatchet job." The report charges that electric companies in the U. S. are far behind in their responsibility to control pollution. Named as the "worst air polluters" were Southern Company, Commonwealth Edison, and American Electric Power Company.

The report said that only 14% of the plants which burn coal were currently using adequate control devices "although highly sophisticated . . . control equipment" has been available to them "for the past 20 years." The Southern Company replied that most of its plants were in remote areas and therefore pollution wasn't a problem because it wasn't harming anyone.

A source from Consolidated Edison said the report badly missed its mark . . . . The material we have received contained errors in fact and contradictory statements . . . . It completely omits any discussion of the economic, environmental, social or health benefits of electricity!

TEACHER COMMENT NO. 8 : Confusion in Profusion

In Paris, France, two 16.5 ft. tall electrically driven vacum cleaner towers have been erected in the Gare De Lyon section of the city. These towers are designed to suck in dust, filter it, and blow clean air out the top. If tests made of the surrounding air show that the towers really work, the city plans to erect between 50 and 100 more around the city. But, that would require more electricity and the burning of more coal or oil to produce it--which in turn would create more air pollution.

Noted newspaper, radio and TV columnist Paul Harvey stated in a recent editorial, "When Does Fear Become Paranoia?", that confusion is mounting in the people as contradictory claims by environmental "experts" continue to inundate him.

Breakfast eggs are a recommended source or protein--
but beware of cholesterol?

Sweeten your favorite foods and your coffee--
but sugar has calories; cyclamates are dangerous; and saccharine is suspect!

World starvation will be the result of overpopulation--
but contraceptive devices can cause cancer and the pill can cause blood clots!

Physicist, Dr. Ralph Lapp says the demand for instant cleanup of the environment is going to create power shortages in the United States which may "produce a severe backlash against the entire environmental movement".

Norman E. Borlaug, winner of the Nobel Peace Prize in 1971, says that a campaign by "hysterical" ecologists to ban pesticides and fertilizers could lead the world to "eventual starvation and political chaos." He predicts that if the pesticides were banned in the United States, crop losses would soar 50% and food

prices would increase four to fivefold. FAO, the world's principal food organization, in agreement with Dr. Borlaug, says: "Until cheap, safe and efficient substitute pesticides are produced and made easily available there is no alternative to the judicious use of DDT."

A team of Detroit researchers declared that the amount of mercury in the environment had decreased in the last 60 years and that mercury pollution no longer presented a health hazard. Dr. Jack Kevorkian, senior researcher, conducted pathological tests on 59 samples of human tissue preserved since 1913. He calls his survey "the most extensive human tissue study of mercury anywhere in the world." Kevorkian also criticized the U.S. Food and Drug Administration for setting the standard of .5 parts per million of mercury in fish as an acceptable level. He said there was no scientific data to support that standard.

TEACHER COMMENT NO. 9 : Three Case Studies

Faced with very serious agricultural problems, the Soviet Union is presently engaged in an attempt to reverse the flow of some of that nation's rivers from their present northward course to the south. Some of these rivers, like the OB, are among the world's largest. This is being done in an attempt to provide additional water for irrigation, hydroeclectric power, etc.

However, many scientists, including Russians, are warning that the Arctic Ocean will be deprived of the warmer waters it receives from these rivers, causing the ice cap to grow southward. It is also feared that this could effect the earth's rotation and CHANGE THE ECOLOGY OF THE ENTIRE WORLD.

A federal attempt to purchase 500,000 acres of the Big Cypress Swamp in Collier County, Florida, to preserve this valuable swampland from destructive development, met with fierce opposition by Collier County officials and residents. They claim that federal ownership of this pine and cypress swampland in southwest Florida would remove one-third of the land in the county from the tax rolls resulting in a tax revenue loss to the county of over $750,000 a year. The county's spokesman, ex-governor of Florida Fuller Warren, told a Senate subcommittee: "Next to the air we breathe, this nation's most precious resource is revenue."

Experts tell us that virtually every stream, lake and estuary in the U.S. is polluted to some degree and getting worse, and that our industries are responsible for some 60 per cent of this contamination. Industry is also responsible for 16 per cent of the air pollution in America. To make prospects even gloomier--industrial production is increasing about 3 times as fast as our population, and there isn't a

single clean major industry at the present in America. Also, for a variety of reasons (mostly economic) industries are not very cooperative in cleaning up.

Some environmentalists want to stop all economic growth as the answer to this problem. With 24 million citizens living below poverty level, this solution just isn't possible or practical. Most industrial pollution can be stopped, or at least curtailed, within current technology. The biggest reason this hasn't been done is an economic one. Cleaning up is expensive. Manufacturers worry about higher costs and consumers about higher prices. Estimates of what the cost would be to clean up industrial pollution in America so we can live with what's left range up to about $14 billion per year. Trouble is, nobody--industry, the consumer, government--is willing to foot the bill.

247

TEACHER COMMENT NO. 10 : Aim of Air Pollution Control

"Our goal is to insure that the quality of the air in the nation's cities and towns does not threaten public health or welfare. Toward this end, it will be necessary to achieve better control in most places of all important types of air pollutants."

"There is a substantial body of knowledge indicating which pollutants are particularly injurious to health and welfare. The common ones include sulfur oxides, particulate matter, carbon monoxide, and organic compounds such as photochemical oxidents, nitrogen oxides, and flourides. Our aim is to control the most common and the most injurious air pollutants, whether coming from factories, automobiles, incinerators, electric power plants, or any other sources. All major sources must be brought under control or air quality will continue to deteriorate."

- Dr. John T. Middleton, Commissioner, National Air Pollution Control Administration.

TEACHER COMMENT NO. 11 : Ecology Centers

Below are listed some of the Ecology Centers across the United States and Canada that are members of the Ecology Center Communications Council. The Ecology Center in your area needs your interest and support.

Greater Boston Ecology Action Center
188 Prospect
Cambridge, MA 02139
(617) 354-9490

Environment Mobilization Fund
13 E. 16th Street
New York, NY 10003
(212) 741-1160

Washington Ecology Center
2000 P Street, N.W., Room 612
Washington, DC 20036
(202) 833-1778

ENACT Ecology Center
417 Detroit Street
Ann Arbor, MI 48104
(313) 761-3186

Ecology Center of Louisiana
Box 15149
New Orleans, LA 70115
(504) 895-5784

Arkansas Ecology Center
316 Chester Street
Little Rock, AR 72201
(501) 374-6271

Minnesota Environmental Education and Research Association (MEERA)
1051 McKnight Road
St. Paul, MN 55119
(612) 735-4089

Community Ecology Center
15 West Anapamu Street
Santa Barbara, CA 93104
(805) 962-2210

Environmental Pollution Center
4030 Old Orchard Road
Montreal, 260, PQ
(514) 484-2145

Peninsula Conservation Center
Box 548
Menlo Park, CA 94025
(415) 322-6671

San Francisco Ecology Center
Sunflower Bookstore
711 Montgomery Street
San Francisco, CA 94111
(415) 391-7664

Valley Ecology Center
Suite 223
119 South Livermore Avenue
Livermore, CA 94550
(415) 443-5483

South County Ecology Center
3667 Castro Valley Boulevard
Castro Valley, CA 94578
(415) 582-7664

Ecology Action Educational Institute
Box 3895
Modesto, CA 95325
(209) 529-3784

Berkeley Ecology Center
2179 Allston Way
Berkeley, CA 94704
(415) 548-2220

Marin Ecology Center
Box 725
San Anselmo, CA 94960
(415) 383-4226

Vermont Environment Center
Ripton, VT 05766
(802) 388-7833

Calgary Eco-Centre Society
1001 7th Avenue, S.W.
Calgary 2, AB

San Leandro Ecology Center
1190 Davis
San Leandro, CA 94577
(415) 635-8200

Philadelphia Ecology Action Center
3907 Spruce Street
Philadelphia, PA 19104
(215) BA2-5247

Ecology Action Center
112 East 25th Street
Baltimore, MD 21218
(301) 366-2070

Eco-Info, Inc.
South Main
Walnut Creek, CA 94596
(415) 937-0209

Ecology Action of San Fernando Valley
9520 Etawanda
Northridge, CA 91324
(213) 886-7306

Earth Action Center
Market Street
Upper Darby, PA 19082
(215) FL2-3344

Ecology Information Center
1221 20th Street
Sacramento, CA 95821
(916) 444-3174

Earthstation 7
402 15th East
Seattle, WA 98102
(206) 543-8700

Sonoma County Environmental Center
211 Santa Rosa Avenue
Santa Rosa, CA 95404
(707) 545-2196

TEACHER COMMENT NO. 12 : Toss a Brick in Your Toilet Tank
"26 Ways You Can Give Earth a Chance"

- Keep your car tuned.
- Ride a bicycle or walk whenever you can. (Automobiles cause 60% of the air pollution.) Drive the car less, pool rides when possible and don't let the motor idle while waiting for someone.
- Use white tissues. (The dyes are harmful to water systems, human tissues, and small animal and plant life in our waterways.)
- Cut out, or cut back the use of fertilizer, herbicides, pesticides.
- Do not burn leaves, incinerators, or fires in your home.
- Make a compost heap for fertilizer and mulch.
- Do not use any kind of plastic wrapping, use wax paper. If you have plastic wrapping or containers, reuse them as often as possible before throwing away.
- Buy soft drinks, etc., in returnable bottles.
- Buy your milk in bottles.
- Do not depend on paper towels - use a sponge or cloth towel.
- Eliminate as many of your paper products as possible - paper plates, cups, napkins. Reuse paper bags often before throwing away. Use cloth napkins.
- Use fewer electrical and motor run appliances.
- Use baking soda and scouring pad instead of strong commercial cleaners.
- Use detergents low in phosphates. (40% of phosphates in water pollution come from detergents.) Better yet, use soap. These products are without or are very low in phosphates: soap powders, dishwashing liquids, borax, washing soda. Use scouring wires, pumice, and baking soda.
- Don't leave the water running when you brush your teeth.

- Don't buy shampoos, lotions, etc., in plastic containers.
- Do not smoke. (Yes, there are 1/2 million tons of tobacco pollution annually.)
- Don't use suntan or body lotions when going swimming in lakes.
- When shopping, check labels for extra unnecessary chemicals.
- Buy food in bulk or larger quantities when possible and refuse to buy products that have unnecessary packaging.
- Grow your own vegetables and fruit if possible.
- Plant trees. (A large tree releases enough oxygen for five people daily.)
- Write to your legislators demanding environmental action. Don't be afraid to speak out! The future of our environment and our lives does not just depend on the other guy! It depends on you!!!
- Don't throw away this paper! Remember these things--and pass it on to a friend.
- And, oh yes, that brick in the toilet tank? If every person in this area were to place a brick in his toilet tank thus displacing water and using less water in flushing, 30,000 gallons of water would be saved daily!

TEACHER COMMENT NO. 13 : The Berkley Case

In 1969 the University of California acquired about 13,500 square yards of land near its Berkley campus. The University had plans to build dormitories on the land in the future and was planning to make temporary use of the land for athletic fields. The University then found itself short of funds and the land was left barren and unimproved.

Soon, local residents, primarily leftists students, Black Panthers, and hippies moved to transform the land into a "people's park". The park was an immediate success; grass had been planted, trees placed and play equipment provided from a variety of sources. Not only did the local people visit the park, but people from the surrounding neighborhoods began to use it as a place to relax and enjoy a little open space.

After a few months the University announced that it was going to make use of the land and told everyone to stop any further work on the park. The park, however, had become so much a part of the community that the people simply went right on using and developing the land. The University then reacted to reported drug useage in the park by fencing off the property and declaring it off limits to everyone. The result of this was rioting and battling between police and area residents.

In attempting to analyze this situation, some would blame the University for its action in closing the park. In fact though, it was trying to avoid use of its property for illegal activity. Some would say that the people of the area were improper in their attempt to take over the land, however their need for recreational land was and is critical. If any good can come of this unfortunate incident, it is in the realization that many of America's cities are far behind in providing suitable recreational facilities and park lands for their citizens.

TEACHER COMMENT NO. 14 : Ecology First

In this age of revolution and rumors of revolution, the one authentic revolution proceeds unappreciated for what it is. Ecology combines the fervor of a new philosophy or religion with the cold force of science. Ecology offers revealed truth, but does not lay claim to ultimate reality. Ecology's assertion of reality sweeps onward with irresistable power. Ecology challenges.

Ecology challenges the autonomy of applied chemistry. It insists that chemists stop behaving like children and indiscriminately spewing poisons into the environment. It suggests that chemists determine in advance the ecological consequences of their chemicals.

Ecology challenges physicists to adopt a similar responsibility for consequences, and encourages them to consider the biological flesh as well as the physical skeleton.

These ecological challenges are theoretical and intellectual. However, at the same time, the niche of ecology is so broad that it touches all men's activities in a very real way. The creation by Congress of National Environmental Policy Law and the revision by the President of powers once held by various Cabinet departments into an Environmental Protection Agency ordains great changes in the way American governmental agencies, companies, and other insitiutions behave. Ecology challenges the widely held assumption that man can always improve upon nature.

Ecology challenges economists to admit more data into their restricted representation of reality by recognizing "externalities." The only hope for economists to retain their self-complacent role as high priests of our society is for them to become ecologists.

The social role ecology will play seems just beginning. The 26th and final recommendation made by the NAS Committee on Resources and Man--the only recommendation made under the heading of

Organization--calls for setting up in the Federal Government "a high-level group of broadly qualified resource specialists and ecologists." Among their recommended duties are "achievement of maximum social well being and international harmony in the uses of resources".

Already ecology has provided society with compelling reasons why it must realign values. It has instructed well-meaning health officials that if they intend to decrease mortality, they must entertain ways to reduce natality as well; it has reminded agriculture that man does not live by food alone; it asks religions: what does it profit man to save his own soul and lose the whole world?; it reminds the hunter of the dangers inherent in exterminating wolves, whales, and birds. It all boils down to one thing--priorities. We have to learn to care about what kind of environment we're going to live in. The question is, will we learn in time?

Perhaps the Ecological Revolution is deceptive because, until recently, it seemed to have been preoccupied with matters of minor importance in the affairs of men. But its revolutionary import is contained in the redefining of man's image of himself and of his role in the world. Man, the only creature who has learned how the system works, has tried to run that system to suit his exclusive needs and wants. Man views himself as the master of his universe and he felt he had the power of knowledge to enforce his commands. But now ecology comes along and shows man that the system is far more complicated than he originally thought. Man is learning that he can't run the system for two reasons: (1) he doesn't yet completely understand it, and he can't control what he doesn't understand; and, (2) he is already beginning to understand that he is a part of that system, not apart from it, and thus he can never become complete master of it. Man must obey certain ecological rules if he wishes to survive and flourish.

Ecologists do not mean that disregard of ecological laws will bring extinction to the species. They are prophets of an even worse fate for man. The ecologist says that refusal to exist in equilibrium with the environment will debase man's habitat, impoverish his posterity, destroy his individual freedom. He

must protect the ecosystem or pollute himself, preserve nature's diversity or live with monotony, respect nature's frontiers or sentence himself to a world-wide prison. These ecological laws are not absolutes. They are, rather, a series of priorities. They allow for the operation of the free will of Man, but they also impose a responsibility upon every thinking human that can neither be shirked nor avoided. This responsibility is the burden that man has assumed along with the power and freedom.

It is not entirely a bleak future that the ecologist sees. In addition to intelligence, adaptability has been man's forte. If, by using his intellect, man will see the need to adapt, and take the necessary action, perhaps he will even encounter an unanticipated side effect--an improved society. Whatever happens, it was through ecology that man first discerned the outlines of incipient hell.

TEACHER COMMENT NO. 15 : Ecumenopolis

The metropolitan city is one of the most complex environments created by man. In certain respects it is also the most vulnerable. A transit or sanitation strike provides a demonstration of how vulnerable an environment the city is. City arteries are thrombotic with traffic and a water main break produces an embolism. American city governments flounder like beached whales. Slum and ghetto chancres erupt and spout forth insidious poisons resulting from internal irritations and disorders.

Still, in spite of their vulnerabilities, cities are probably the most notable and durable of man's creations. From these nests, the fruits of the agricultural revolution, man has spun the web of today's global civilization. These repositories and generators of human culture and intellectual achievement appear to exemplify the ecological correlation between complexity-diversity and stability. Paris has endured the vicissitudes of Gaul and France for more than two millenia. Rome has existed for 3,000 years while great empires have risen, flourished, decayed and disappeared. London has gone forward from being the capital of a Belgic tribe; survived the Romans, Saxons and Normans; gradually extending its influence to be the heart of a great empire. That empire has gone, but London remains, pulsing with new life and adapting to new situations in the political economic environment. It becomes apparent that the time has come for an urban ecology.

In the urban ecosystem, the rain falls on the city but the inhabitants obtain their drinking water from reservoirs perhaps 100 miles away. Although there are plants within a city, the resident gets his fruit, vegetables, meat, from far-away parts of the world. Boats, planes, trains, trucks and automobiles link the city with producers all over the world. The city could not survive without these links. The modern metropolitan area is a nexus. The larger the city, the greater the reliance on the outside world.

Just as man's goods and water come from outside the city, his "wastes" do not fertilize the ground beneath him. Biological waste material is partially broken down and then carried away in rivers. Industrial wastes are dumped into rivers, streams and lakes. Solid wastes are incinerated into the urban air or used as landfill.

Cities undergo ecological succession just like a natural ecosystem. It starts with pioneer colonizers. These trappers or hunters leave little mark on the land. They are followed by grazing or subsistence farmers who completely change the natural environment. Some plant and animal species are destroyed, much is displaced or dispossessed. Industrialization grows within the hub of the farming area. Urbanization follows. Great portions of natural landscape have been replaced by areas of concrete, asphalt and steel. Subordinate animal species have changed to mostly Norway rats, mice, pigeons, starlings, sparrows, cockroaches, flies, dogs, cats, and bedbugs.

In the primitive stages there is virtually no division of labor except between men and women. But, as cities develop, the generalists must give way to the specialists. As society grows the need for specialized talents and control grows also. The country boy saw opportunities in the far-off cities. Today, the classified section of the telephone book will indicate how far this process of specialization has gone. This process of specialization takes a toll, however. In an age of specialization most people remain as ecological pioneers---generalists--in a world dominated by complex communities. They have as little chance for survival as pine seeds shed in the shade of a mature forest.

As the city strives to maintain dynamic equilibrium it undergoes further changes. After a landlord abandons his decaying property, the tenants remain only for 60 to 90 days. Within six months after the first house is abandoned, the entire block is deserted. Within that first year the population changes from working resident to a community of addicts, derelicts and winos.

In Chicago a study has shown the ecological pattern that emerges when blacks move into a white

area. White workers leave. Industry--already losing pace with modern technology in their obsolete structures, and seeking excuses for change--unsatisfied with unskilled blacks and oppressed by the weight of constantly rising taxes, move out. Due to the lack of black buying power as jobs decline, many stores move out and their place is taken by "store-front" churches. As local jobs decline and more buildings are abandoned, blacks must spend more for higher rents and transportation to jobs which are only available in transplanted industry far from their neighborhood. The deterioration, inequity in living costs, squallor, frustration, erupt in protest and demands for improvements. And so the deteriorating spiral goes.

The most dramatic development in post-urban ecological succession has been suburbanization. A February, 1970 Gallup Poll found that six of ten people living in the nation's metropolitan centers would move to less urbanized areas if they could. Man is apparently seeking a balance between the advantages of aggregation and isolation. The break-up of cities suggests that aggregation can reach a point beyond which the advantage to the population as a whole declines. Man seeks an esthetic combination of the beauty of the wilderness, the tidy competence of the suburbs, and the complex conveniences of the city.

The Greek urban and regional planner Constantinos Doxiadis foresees the entire globe becoming one interlocking world-city. He envisions "Ecumenopolis"--"a gigantic city of superhuman dimensions, made up of small units" (of about 50,000 inhabitants). Nature would be "converted into a gigantic network with tentacles penetrating deeply into all parts of the universal city so as to reach every residential area--a system of woodlands transformed into parks, intersected by avenues and gardens, within easy reach of our homes Once we become convinced that this world-city is inevitable, even though it is a frightening conurbation, the only choice is to build it properly, according to Doxiadis.

That means, for instance, putting transportation underground. Doxiades compares transportation in the human ecosystem to the circulatory system in the human body. This will prevent a human breakdown

which congestion could bring about, and prevent such disasters as when one and a half million Indians starved to death during World War II. not from lack of food. but because of a breakdown in transportation.

Physicist Edwin Marston calculates that because of rising costs, physical obstacles, and objections of conservationists, we are near that point where it is no more expensive to build a mile of railroad tunnel than a mile of surface highway. And, from the point of view of a metropolitan community, there is no comparison between the benefits inherent in the two. Marston points out that rails are 100 times more economical in land use, require one-tenth the fuel, and require just a few energy plants whereas millions of auto engines distribute pollution thoroughly over the urban-suburban landscape. In addition, the automobile kills a great many people, presents a solid waste problem, poses a resource problem because it voraciously consumes petroleum, disrupts cities, is ultimately responsible for oil spills, and causes air pollution.

"It is ironic," Marston wrote, "that Governor Rockerfeller declared war on pollution a few days after he agreed to a subway and bus fare increase. The fare increase will divert travelers from mass transit to taxis and private automobiles and this diversion will probably add an additional 15 million pounds of pollution to New York City's air every year." Dr. Marston calculates that the auto emits one pound of pollution for every 10 miles traveled, and the public transit fare increase would shift 100 million riders to autos each year. Henry Ford mass-produced the Model T and America got smog, urban sprawl, and supermarkets.

Communications represents another urban network that has no direct counterpart in the natural ecosystem. The flow of energy, moisture, and nutrients serves to inform the natural community on how well or poorly it is doing. As the niches proliferate there are more routes for information. The total information in the community increases, which means that the number of possible interactions between species, individuals, and materials increases. If the health and well-being of the human ecosystem are

regulated by communications governors and feedbacks, freedom of the press can be seen not as a political ideal but as an essential method for maintaining the viability of society.

TEACHER COMMENT NO. 16: The Population Dilemna

Most Americans today recognize that the world is threatened by an unprecedented population explosion. The earth is rapidly becoming too crowded. More than 3.5 billion people now live on it. By the year 2000 (only 28 years from now) that number is expected to double to almost 7 billion. Without affirmative action to either curtail present trends or find presently undiscovered solutions for this and the staggering multitude of inter-related problems, the peoples of the developing nations of Asia, Africa, and Latin America can expect nothing in the years ahead but growing starvation, misery, and the overwhelming despair of life without hope. Although the technologically more advanced nations of the world will probably not be affected quite so soon, they, too, must inevitably follow in the footsteps of their brethren. Awareness is a necessary first step.

U.S.A. In 1950 there were 151 million persons in the United States. Today there are 208 million an increase of 33 percent in 20 years. Should the present fertility rates of the late 1960's persist, the U.S. population will increase to 300 million by the year 2000. Even if we return to the relatively smaller family size that characterized the 1950's and early 1960's (the 3-child family), the United States will find itself staggering under a burden of one billion citizens 100 years from now.

When the number of births each year in a nation is equal to the number of deaths (leaving aside immigration) that nation has achieved a stable population or zero population growth (ZPG), and the population remains constant from year to year. Long term stabilization in the U.S. would require an average of approximately 2.1 children per family. According to the interim report of the Commission on Population Growth and the American Future sent to Congress in 1971: "We are currently reproducing at a rate roughly midway between two and three children, which would bring us to 300 million around the year 2008."

It should be pointed out that, even if the U.S. were to begin averaging 2 children per family tomorrow. it would take 65 to 70 years and an increase of 70 million population before ZPG were reached.

Of additional information, recent studies indicate that between 15 and 20 percent of all births in the U.S. from 1960 to 1965 were unwanted. 4.7 million births over that period would have been prevented by the use of "perfect contraception".

INDIA. According to the 1971 census, India's population is 547 million. India ranks second in world population numbers (China leads with 750 million) and seventh in land area. With only 2.4 percent of the world's total land area, India must support 14 percent of the world's total population, and on 1.5 percent of the total world income. To this population a baby is born every second and a half, about 20 million births a year, a crude birth rate of about 39 per 1000. Even with a death rate of about 8 million per year, India adds about 12 to 13 million people a year to her population (Australia's present population). Between 1947 (when India gained independence) and mid-1970, India added more than 200 million to her population. This increase in population placed demands on Indian economy and society to an annual tune of 126,500 schools, 372,500 teachers; 2,509,500 houses; 188,774,000 meters of cloth; 12,545 quintals of food; and 4,000,000 jobs. In other words, each year India must produce as much as she has produced in the past 20 years to maintain the present standard of living for the population.

Although India's problem of population is the result more of a decreasing death rate than an increasing birth rate, she has undertaken the world's largest population control program in the world. The government's declared objective is to reduce the birth rate to 25 per 1000 as expeditiously as possible. Of the 105 million married couples living in India, over 90 million couples are in the reproductive age group. Random samplings show that, in the past few years, the government's efforts have succeeded to the extent that, among couples having at least three children, 70% of the wives and 66% of the husbands are in favor of family planning for economic and health reasons.

TEACHER COMMENT No. 17 : The Crusade is in Danger

Earth Day buttons have served their purpose. Public awareness of the environmental problem is the first step toward solving it. But in between awareness and action are a vast number of practical problems which necessitate difficult decisions. Peter F. Drucker, Clarke Professor of Social Sciences at the Claremont Graduate School in Claremont, California, and Professor of Management at New York University, set forth a cogent and objective analysis of the environmental question in a recent article in Harper's Magazine entitled"Saving the Crusade." Fully cognizant of the dangers of pollution, Drucker shows an exceptional ability to balance the need for achieving environmental protection with the potential socio-economic costs of so doing. As a result, he has derived a more viable scheme for remediation of environmental problems than many "crusaders" with a more partisan outlook.

The article first provides perspective on what the author considers to be widespread illusions concerning the drive for a cleaner environment. The first misconception is that a clean environment can be obtained by tapering down or even abandoning our burgeoning technology. Drucker considers this solution simplistic and even suicidal. He points out that most environmental problems call for technological solutions. For example, the three major sources of water pollution--human wastes, effluents from mining and manufacturing concerns, and activities of farmers and loggers--will yield only to advanced technological controls In essence, Drucker maintains that new ecological safeguards must be geared to operate within the system which produced the original dangers, not against it.

The second delusion referred to is the common belief that the business which cause pollution can readily absorb the costs of correction out of profits. Taking as an example the American Power Company (which operates in the Midwest and upper South), Drucker observes that even a company which is

reputed for its ecology-minded programs, including involvement in TVA, could not effect a total clean-up of its own processes without consuming its entire annual profit. Furthermore, the ancillary expenses of abandoning strip mining for coal or reclaiming stripped areas could double fuel costs. And the potential expense of putting power lines underground would be incalculable. Businesses alone cannot bear the expense of cleaning up the environment. The economic burden, Drucker asserts, must ultimately be borne by the people, as consumers and producers. This means for the consumer, higher prices; for the taxpayer, higher taxes.

The third fallacy Drucker examines is the idea that we can relieve the environmental crisis by reducing industrial production. Paradoxically, the author suggests that the only workable scheme to protect the environment will involve not industrial cutbacks--but further expansion. He adduces three basic arguments to resolve the paradox. First, the task of cleaning up the environment will rely primarily upon processes which require enormous amounts of electrical energy. Power plants, in turn, are themselves major sources of pollution, especially thermal pollution, a problem we are not yet capable of controlling. Yet Drucker takes issue with conservation groups which have jumped on a "ban power plants" bandwagon over the past five years. Opposition to new power plants has postponed the accomplishment of certain ecological tasks, impeded the implementation of electrified mass transportation and the development of electrical automobiles (both alternatives to heavily polluting internal combustion engines), and incurred the risk of widespread power shortages along the Atlantic Coast which could ultimately cause a "backlash" against the environmental crusade. Secondly, rapid cutbacks in production would inevitably create massive unemployment, especially among low-skilled laborers, including large percentages of blacks and other minorities. And third, increased industrial output will be essential to expand the economy enough to sustain spending for human resources programs and basic defense needs concomitantly with a comprehensive ecological program. Despite the environmental risks

of increased production, then, Drucker claims it is a technological, sociological and economic necessity if long-term ecological improvement is to be realized.

The fourth misconception Drucker seeks to dispel is the attempt to legislate a clean environment through punitive measures. He maintains that punitive legislation can succeed only when the violators are in the minority. When nearly everyone classifies as a violator, a workable means of enforcement is virtually impossible. Instead, he proposes legislative measures which create an economic impetus towards compliance, rather than avoidance, and thus police themselves. For example, rather than enact punitive laws compelling automobile manufacturers to install emission controls on all new cars and then attempt to force 100 million users to maintain the equipment properly, the government should establish economic incentives to accomplish the same objectives--lower registration fees for cars which show proper upkeep on pollution controls, and tax incentives for manufacturers which develop more efficient pollution control devices

Having broadened perspective on the above four "misbeliefs," Drucker proceeds to stress the complexity of the environmental cirsis. He delineates a number of problems which will command extremely difficult decisions in terms of human consequences. One such problem is the necessity of "trading off" between a cleaner environment and unemployment. An example is the Union Carbide plant in Marietta, Ohio, which opened in 1951. The plant rained pollution on Vienna, W. Va., eliciting a civic campaign which ultimately caused the plant to clean up its processes. In so doing, however, it laid off 50 per cent of its labor force, including half the people of Vienna. The Vienna case epitomizes the situation of a marginally productive plant in an economically depressed area--one which cannot economically convert to cleaner processes. Which is worse: ravaging the environment, or destroying the economy of a region? A second problem is the necessity of developing and integrating an international campaign to save the environment. Can the United States initiate such an endeavor without attempting to "police" the world? Another complex "trade-off" involves the question of pesticides. No safe pesticides are

presently in existence, or will be in the foreseeable future. Drucker asks, in effect, if you can reconcile the "Ban DDT" movement with the threat of massive epidemics and famines. For example, Ceylon, once a hotbed of malaria, has experienced a tremendous resurgence in the disease since DDT spraying was halted a few years ago. And forests along the New England Turnpike have been almost completely defoliated by gypsy moths since aerial spraying was terminated. Drucker lists other dilemmas: the health hazards of the birth control pill, as opposed to the dangers of abortion (and overpopulation); the danger of thermal pollution and radiation from nuclear power plants, against the necessity of generating electricity to combat other forms of pollution; and the polluting potential of chemical fertilizers, compared with the urgent need for food in an overpopulated world.

How can problems like these be resolved? Any decisions will involve risks, Drucker tells us, to do nothing constitutes an even greater risk. The solution he proposes calls for decisions which strike up a combination of "lesser evils," coupled with a unified and concentrated effort to implement those decisions. Priorities must be established. First on the list are "action priorities"--a few minor but clearly delimited and discernible tasks which submit to concrete short-term solutions. For example the hazard of lead poisoning in old tenements could easily be remedied by employing a substantial number of black adolescents (traditionally high on the unemployment list) to burn off the old paint.

Such projects, however, are admittedly marginal to the basic pollution problem. Subsequent priority-setting should divide programs into two categories: those requiring immediate action, where we have the technological know-how to proceed; and those involving research, where we do not at present have the capacity to initiate remedial measures. In the former category, Drucker places primary emphasis on the control of air and water pollution, where we have at least enough technological competence to BEGIN. In the latter, he stresses three long-term research projects: developing cheaper, more effective and more acceptable means of birth control; learning how to generate electrical power

without creating thermal pollution, and devising methods of raising crops without releasing ruinous quantities of pesticides, herbicides and chemical fertilizers into the environment. In the meantime, the author recommends the continued construction of power plants and utilization of pesticides and fertilizers dispite the environmental damages they cause, on the grounds that we cannot die of starvation or disease while solutions to environmental problems are being developed.

Drucker concludes with an appeal for coherent long-range planning and a mobilization of all our resources, technological and human, to confront the complex problems of environmental protection. He maintains that the day for "flaming manifestoes" and "prophecies of doom" is past, and that a vindicitive police-type approach can only exacerbate the problem. Public awareness of the environmental crisis was the first step. It is now necessary to educate the public to the choices it faces, and then formulate a world-wide effort to follow through on the decisions which result.

TEACHER COMMENT NO. 18: Is Rhetoric Enough?

"As long as consumers expect goods to be produced at the lowest possible cost, in the largest quantity, at the greatest possible convenience - without regard to environmental consequences - then all the nature-loving rhetoric on earth is not going to save the earth."

-Governor Nelson Rockefeller of New York

TEACHER COMMENT NO. 19: What You Can Do, Right Now, About The Mess We Live In

SYMPTOMS	TODAY in these UNITED STATES	SLIGHT RELIEF right now, while we press for real solutions.....	SOMEDAY, if we live to see it.....
too many PEOPLE	200 million of us, or 400 times as many as there were when nature was in balance. We wreck the land, but continue to talk of growth as the only kind of progress.	Practice voluntary population control before some natural disaster - or war - controls it for us. Don't believe the misleading reports about the U.S. birth rate. The number of births here grows each year. Learn about the starvation in India, China, Latin America, and Africa and relate it to your life.	An enlightened people will reduce their numbers.
too much TRASH	1000 lbs. of trash per year per person, most of which we still burn and then dump into the sky.	Buy no more "one way" containers or bottles; refuse to accept fancy or excessive wrappers; push for publication of newspapers and magazines printed on salvaged waste materials. (Store managers and their suppliers are very sensitive to public pressures. Try it; it works; my grocer never offers me a bag anymore when I buy only a few items.)	All trash will be reused at home or by the growing waste-recovery industry. Following nature's example, we will learn to manage materials without waste.
POLLUTED AIR	Foul, brown air, and rising rates of lung disease. Uncounted millions of cars causing most of the pollution,	Walk whenever possible, cars are the big air-foulers, and their smoke devices aren't worth a damn. They last only a few months. Use public transportation.	When we learn to manage aerial wastes along with all the others we'll have those beauti-

SYMPTOMS,	TODAY in these UNITED STATES	SLIGHT RELIEF right now, while we press for real solutions.....	SOMEDAY, if we live to see it .....
	but we're too weak to walk.	Walking is healthful and it teaches lasting lessons about what foul-smelling inventions our precious automobiles are.	ful skies again. Under present federal programs this will never happen, but if all waste dumping were penalized NOW we could have fresh air again within ten years. Imagine!
too much GARBAGE	100 lbs. per person per year, all wasted. Enough to feed legions of the world's starving. It's tragic.	Most of us overeat by 30%. Eat less, live longer. Use all vegetable garbage for compost or throw it into the shrubbery (it beats peat moss). No meat, though; meat brings rats and flies. Ready-to-serve products appear to have no waste. Don't be mislead; they make mountains of garbage back at the factory.	As with trash, we will learn to use all parts of the food, extracting its energy and nutrients to feed man and animals, or the land itself.
too much SEWAGE	200 gallons of sewage per person every day! And it all ends up in the rivers, often completely untreated. Almost nothing can live in such vile waters.	Don't grind garbage down the drain; if you must leave food wastes, use them if at all possible. Don't over-use dishwashers or detergents. We use too much too often; it's so easy to do. Don't flush toilets so often; a tissue or cigaret butt flushed away with 2	Kitchens, laundries, and bathrooms will have devices to extract wastes for re-use, and recycle the same water, over and over. Sewers will at last become

SYMPTOMS	TODAY in these UNITED STATES	SLIGHT RELIEF right now, while we press for real solutions.....	SOMEDAY, if we live to see it.....
		gallons of precious water is criminal in these times. Try to cut all water-use in half; it's far more noble than you think. Patriotic, too.	obsolete.
NOISE	Constant noise, car noise, electronic noise, aircraft noise, and human noise, all growing in intensity by the day. Soon: Sonic BOOM!	Turn it down a bit. In this increasingly crowded world we must be more considerate or we'll be at each other's throats. Join the crowds who've vowed never to ride a supersonic transport. Insist on quiet. Use rent strikes and other means to get healthful silence.	We can't change the human body fast enough to accommodate it so we've got to reduce and isolate the noise.

221

World Wildlife Fund
910 Seventeenth Street, N.W.
Washington, D.C. 20006

TEACHER COMMENT NO. 20 : Official Report on the Cost of a Cleaner Environment

"Protecting the environment and reducing the harmful effects of pollution will not be without adjustments. Some firms and activities will find it difficult to accommodate to new rules. A few may well find it impossible To deny that there will be transitional problems, including temporary loss of jobs, would be to deny that any major shift of resources can be accomplished without some dislocation and some turmoil."

Impact on economic growth. "Biggest impact will be to change the composition of output rather than the total value of the national product." As more resources are used for improving the environment, fewer final goods and services will be produced than otherwise. In this sense, trade-offs will need to be made between environmental values and what has come to be regarded as traditional economic output . . .

"The effect of diverting funds to environmental controls is to raise prices for those goods that require such controls. When total gross national product is corrected for such price increases, the measured output of the economy will be slightly smaller.

Effect on business and industry. "Some companies--particularly those that must absorb large pollution costs--will be hard hit. But many firms will benefit, and new firms and industries will emerge in response to changing environmental demands . . .

"The initial force of added costs, particularly for water-pollution control, will strike the pulp and paper, chemicals and primary-metals industries heavily . . .

"Not all industries are adversely affected by pollution-control measures. Indeed, as the economy gears to higher levels of environmental protection and enhancement, some industries will be better off. Obvious examples are the suppliers of waste-water-control equipment and the construction industry."

How prices of cars will increase. "The automobile will be heavily affected by air-pollution controls. The cost of emission-control devices alone is conservatively estimated to raise the average new-car costs in 1975 by about $240, and the actual costs will probably be higher. These controls will result in increased automobile operation and maintenance costs of about $20.70 per year.

"The impact of the cost on 1976 models, the year in which nitrogen oxides must be controlled, has not been calculated because nitrogen-oxide-control technology has not yet been developed."

Some small businesses could be hard hit. "Smaller firms operating single plants will tend to be more vulnerable to failure than large corporations with multiple plants and technologies. However, industries burdened with the highest environmental costs, such as chemicals, iron and steel, and pulp and paper, are mostly characterized by bigger companies operating many plants, old and new. Hence, the impacts of pollution-control expenditures on small business are not as severe as they would first appear . . . Recent case studies undertaken by the Environmental Protection Agency demonstrated that pollution-control requirements accelerated the rate at which firms failed. But in most instances studied, a large number of other factors was chiefly responsible for the failures, and the plants would have closed anyway."

Number of jobs involved. "One way to gauge how employment may be hit by a speedup of environmental spending is to look at the total number of jobs in pollution-intensive industries . . .

"The employment in those industries that will be impacted to any significant degree by pollution control amounts to about 7 per cent of the current work force. And of that, only a small percentage will be in those plants which would be so severely hit as to face possible layoffs."

Higher prices and higher taxes. "Minor amounts of environmental costs may be absorbed in lower profits to firms, but generally the costs will be passed on in higher prices. Necessary public expenditures will be reflected in higher service charges, taxes or decreases in other public services . . .

"The funds for pollution control that come from the Federal Government are largely the product of

progressive taxes, so a greater portion of the cost is borne by higher-income taxpayers. State taxes are mixed: Income taxes tend to be progressive, but sales taxes are not. Local government's share, based largely on property taxes and sewer-service charges, however, tends to burden lower-income taxpayers more . . . .

"A cleaner environment--particularly air over the cities and improved sanitation--will greatly benefit low-income groups. And considering that cost increases will not be a significant part of the personal budget, the concern that the low-income groups bear a heavier share of the cost for a cleaner environment is eased, although not eliminated."

Impact on U.S. trade abroad. "Some U.S. firms will be faced with increased costs for their products which may not be matched by similar increases for foreign goods. However, environmental costs are but one among many international competitive factors and are often dwarfed by others . . . .

"In the United States, the primary responsibility for preserving and cleaning up the environment rests with those who degrade it, and prices of products reflect environmental-cleanup cost . . .

"Some domestic U.S. industries will certainly be placed at a disadvantage as new standards are implemented . . . .However, most U.S. exports and imports are not goods with high pollution-control costs . . . .

"Whatever competitive advantages foreign products enjoy in the near term will shift as all nations begin to upgrade environmental quality . . . .Moreover, its technological lead should establish the United States as an exporter of pollution-control devices and engineering competence."

- From the second annual report of the Council on Environmental Quality, sent to Congress by President Nixon on August 6, 1971.

TEACHER COMMENT NO. 21: Groups Help The Environment

"Litigation brought by private groups which must rely on contributions for support . . . has strengthened and accelerated the process of anti-pollution enforcement."

-Russell E. Train, Chairman, Council on Environmental Quality

TEACHER COMMENT NO. 22

People, Not Clubs, Must Sue Over Environment Ills—Court

TODAY, Thursday, April 20, 1972

TODAY—Washington Post News Service

WASHINGTON — The Supreme Court held Wednesday that deep concern and knowledge about the environment are not enough to give groups like the Sierra Club the right to sue the federal government over misuse of national resources.

But the court added that anyone who does have legal standing — such as a hiker or a park user — can take the government to court for a wide range of injuries to his "esthetic and environmental well-being."

The 4 to 3 decision in a dispute over a proposed Walt Disney Enterprises resort complex in the Sierras was a partial setback for environmentalists but also a major victory.

From now on, organized environmentalists may not sue in their own name, but they are free to continue financing lawsuits in the name of individuals with a more direct interest in a threat to forests, streams and parklands.

The majority indicated its belief that the Sierra Club could easily produce a live plaintiff to keep trying to halt the contested Mineral King development.

The court also made clear that old legal concepts restricting plaintiffs to redress for economic injury have been discarded.

"Esthetic and environmental well-being, like economic well-being, "are important ingredients of the quality of life in our society" and they are no less deserving of court protection because such arm is felt widely throughout society, Justice Potter Steward wrote for the court.

Steward, who was joined by Chief Justice Warren F. Burger and Justices Byron R. White and Thurgood Marshall, also made clear that Congress is free to broaden the legal definition of an "aggrieved person" which was the basis of the fight over legal standing.

A bill which would accomplish that aim has undergone Senate hearings and is scheduled for a vote on Friday in a commerce subcommittee on the environment. The bill also would ease the heavy burden now placed upon challengers to highway and other projects when the court is weighing evidence on both sides.

TEACHER COMMENT NO. 23 : Images of Responsibility

I can imagine a world within which machines function solely for man's benefit, turning out those goods which are necessary for his well-being, relieving him of the necessity for heavy physical labor and dull, routine, meaningless activity. . . . It is not an overcrowded world; lives in balance with his environment, nourished by nature in harmony with the myriads of other life forms that are beneficial to him. He treats his land wisely, halts erosion and overcropping, and returns all organic waste matter to the soil from which it sprung. He lives efficiently, yet minimizes artificiality. It is not an overcrowded world; people can, if they wish, isolate themselves in the silence of a mountaintop, or they can walk through primeval forests or across wooded plains. In the world of my imagination there is organization, but it is as decentralized as possible, compatible with the requirements for survival. There is a world government, but it exists solely for the purpose of preventing war and stabilizing population, and its powers are irrevocably restricted. The government exists for man rather than man for the government.

In the world of my imagination the various regions are self-sufficient, and the people are free to govern themselves as they choose and to establish their own cultural patterns. All people have a voice in the government, and individuals can move about when and where they please. It is a world where man's creativity is blended with the creativity of nature, and where a moderate degree of organization is blended with a moderate degree of anarchy.

Is such a world impossible of realization? Perhaps it is, but who among us can really say? At least if we try to create such a world there is a chance that we will succeed. But if we let the present trend continue it is all too clear that we will lose forever those qualities of mind and spirit which distinguish the human being from the automation.

- Harrison Brown, The Challenge of Man's Future.

TEACHER COMMENT NO. 24: We Lack A Land Ethic!

Beyond all plans and programs, true conservation is ultimately something of the mind - an ideal of men who cherish their past and believe in their future.

Most Americans find it difficult to conceive a land ethic for tomorrow. The pastoral American of a century ago, whose conservation insights were undeveloped, has been succeeded by the asphalt American of the 1960's, who is shortsighted in other ways. Our sense of stewardship is uncertain partly because too many of us lack roots in the soil and the respect for resources that goes with such roots. Too many of us have mistaken material ease and comfort for the good life. Our growing dependence on machines has tended to mechanize our response to the world around us and has blunted our appreciation of the higher values.

There are many uprooting forces at work in our society. We are now a nomadic people, and our new-found mobility has deprived us of a sense of belonging to a particular place. Millions of Americans have no tie to the "natural habitat" that is their home. Yet the understanding of the grandeur and simplicity of the good earth is the umbilical cord that should never be cut. If the slow swing of the seasons has lost its magic for some of us, we are all diminished. If others have lost the path to the wellsprings of self-renewal, we are all the losers.

Modern life is confused by the growing imbalance between the works of man and the works of nature. Yesterday a neighbor was someone who lived next door; today technology has obliterated old boundaries and our lives overlap and impinge in myriad ways. Thousands of men who affect the way we live will always remain strangers. An aircraft overhead or an act of air or water pollution miles away, can impair an environment that thousands must share. If we are to formulate an appropriate land conscience,

we must redefine the meaning of "neighbor" and find new bonds of loyalty to the land.

One of the paradoxes of American society is that while our economic standard of living has become the envy of the world, our environmental standard has steadily declined. We are better housed, better nourished, and better entertained, but we are not better prepared to inherit the earth or to carry on the pursuit of happiness.

A century ago we were a land-conscious, outdoor people: the American face was weather-beaten, our skills were muscular, and each family drew sustenance directly from the land. Now marvelous machines make our lives easier, but we are falling prey to the weaknesses of an indoor nation and the flabbiness of a sedentary society.

A land ethic for tomorrow should be as honest as Thoreau's Walden, and as comprehensive as the sensitive science of ecology. It should stress the oneness of our resources and the live-and-help-live logic of the great chain of life. If, in our haste to "progress," the economics of ecology are disregarded by citizens and policy makers alike, the result will be an ugly America. We cannot afford an America where expedience tramples upon esthetics and development decisions are made with an eye only on the present.

-Steward L. Udall, The Quiet Crisis.

TEACHER COMMENT NO. 25 : Decisions for Tomorrow

Man, too, is part of the chain of life, linked inextricably with other, interacting, organisms. With his machines and technical prowess he is now an agent of change whose cataclysmic powers dwarf the destructive but localized potential of nature's typhoons and earthquakes. Man is now the uneasy custodian of the Promethean flame. He can extinguish most forms of life on this planet and destroy the chain of life itself. He is no longer just another dancer in the system, but can control the terrible tempo of the dance itself and renew or destroy its essential rhythms.

The effects of man's destructive influence on his environment go beyond the physical impairments characterized by the broad terms "pollution" and "overconsumption." Too little professional attention has been given the effects of the environment on the human psyche. Until we become better able to measure the effects of human contact with the various components of the environment, we are almost forced to conclude that if we are not being subtly poisoned, unnerved, or irradiated, we have arrived at the good life.

Our best efforts to bring population into balance and to build cities that will nourish the whole man cannot succeed unless, as a nation, we obey the imperatives of ecology. By accepting fully the discipline of this master science, the other branches of science will, in turn, become sensitive allies of beauty and order. Once we begin to work with, rather than against, the immanent laws of this planet, we will alter our national attitudes toward growth and devise the means of social control that will enable us to make sound stewardship our national policy.

- 1976: Agenda for Tomorrow, Stewart Udall.

TEACHER COMMENT NO. 26 : Small Group • Self-Evaluation

Instructions: Students are to list members of their group (with the exception of themselves) in the order of how valuable each was in accomplishing the group's goals. The ranking of members is collected and each group member's total score is determined by adding up the number he was ranked by each of his fellow group members. Each student's group rank is determined by listing them from the lowest total score to the highest total score. The member with the lowest total score is considered to be the most valuable.

Sample Form for Students

SMALL GROUP SELF-EVALUATION

Instructions: List group members in the order of how valuable each was in accomplishing the group's goals. Do not list your own name. For example if your group has six members, list five names in the order of their importance to your group's success. By each name indicate the grade you think each member deserves and make any comments about their work that you wish. This individual evaluation will remain confidential.

Rank Order of Members of the Group. (Names)	Letter Grade They Deserve	Comments
1.		
2.		
3.		
4.		
5.		

TEACHER COMMENT NO. 27 : Small Group • Flow of Contributions

Date_____

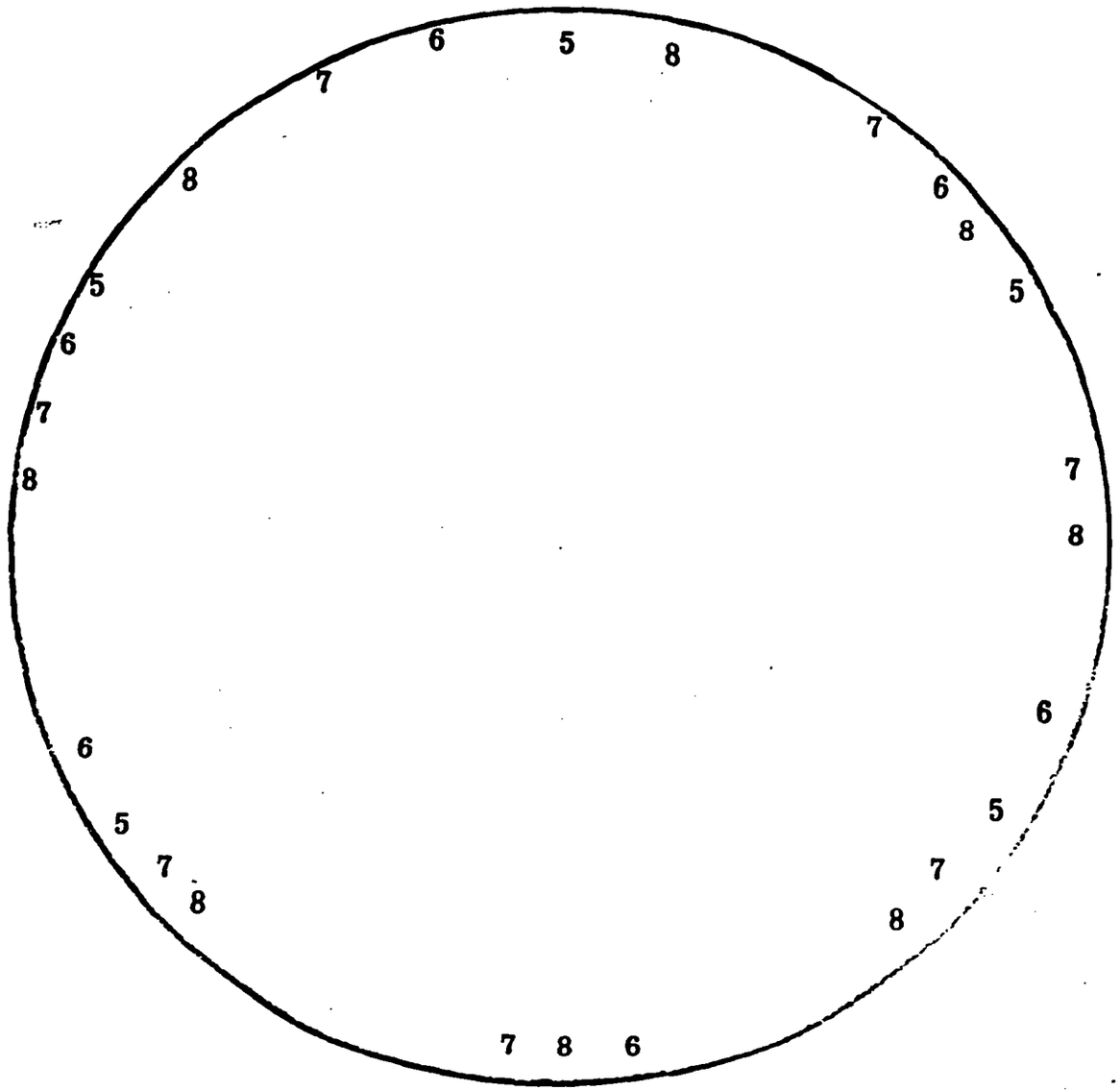
Time_____ to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw a straight line from the first person who makes a contribution to each succeeding contributor as long as the discussion proceeds.

Evaluator_____



TEACHER COMMENT NO. 28 : Small Group • Pattern of Contributions

Date_____

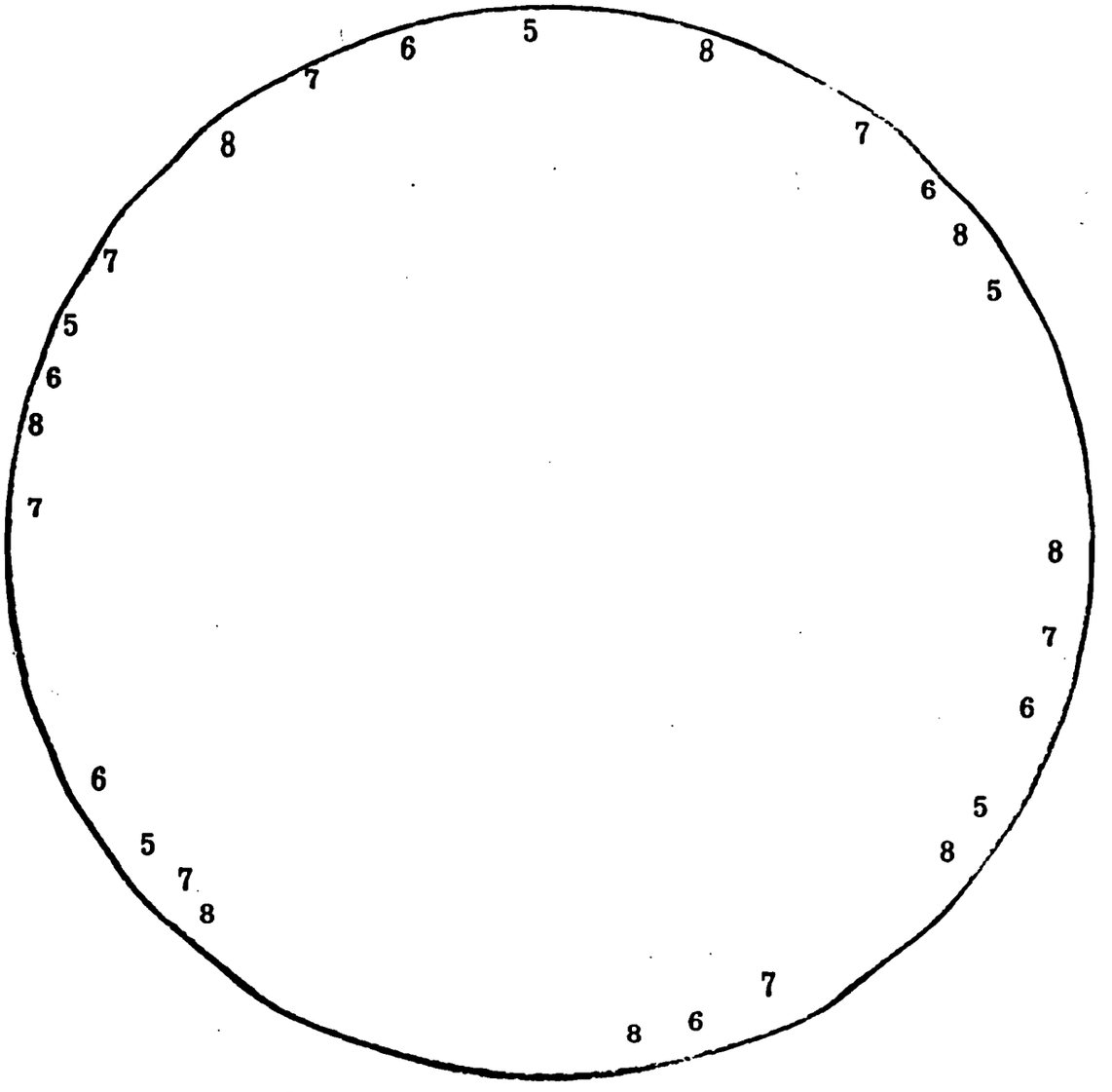
Time_____to_____

Problem_____

Instructions:

Circle each number that corresponds to the number of participants in the group and write the name of each member on one of the numbers. Draw an arrow (length of arrow in proportion to length of contribution) from the contributor toward the person to whom the contribution is directed. If the contribution is directed toward the entire group, direct the arrow toward the center of the circle.

Evaluator_____



TEACHER COMMENT NO. 29 : Small Group • Individual Evaluation

Date_____ Time_____ to_____ Problem_____ Participation_____

Excellent Poor	Item
1 2 3 4 5	1. Was well prepared for discussion
1 2 3 4 5	2. Used prepared outline properly
1 2 3 4 5	3. Kept running outline of discussion
1 2 3 4 5	4. Contributed readily at every opportunity
1 2 3 4 5	5. Contributions were presented at the proper time
1 2 3 4 5	6. Contributions were brief
1 2 3 4 5	7. Contributions were clearly stated
1 2 3 4 5	8. Showed evidence of a firm grasp of discussion theory
1 2 3 4 5	9. Used constructive reasoning rather than intentional reasoning
1 2 3 4 5	10. Demonstrated objectivity
1 2 3 4 5	11. Reasoned critically
1 2 3 4 5	12. Showed open-mindedness
1 2 3 4 5	13. Provided sources of facts and other bases for opinion readily
1 2 3 4 5	14. Answered questions asked of him readily
1 2 3 4 5	15. Listened well to contributions of others
1 2 3 4 5	16. Demonstrated an attitude of cooperation rather than competition
1 2 3 4 5	17. Talked clearly, distinctly and audibly
1 2 3 4 5	18. Courteous and respectful of others (didn't interrupt, etc.)
1 2 3 4 5	19. Encouraged others to contribute to the discussion
1 2 3 4 5	20. Assisted in providing leadership services
	Total Evaluation
1 2 3 4 5	Rating of total performance in relation to other members of the group
	Group Evaluation
1 2 3 4 5	Rating of the whole group in relation to other group discussions witnessed.

Instructions: Circle the number for each item that tends to represent your opinion about the quality of participation demonstrated.

Evaluator_____

TEACHER COMMENT NO. 30 : Evaluation Form for Visuals

There are four major areas of importance indicated on this form. Teachers who grade on a percentage basis should insert a value in each blank to determine the weight of each area in relation to the others, making the sum of all blanks on a perfect item total 100. Teachers using other systems (such as variable points) should determine the proper value of each area. Note: part 4 clarity, has four sub-areas which combine to make the total value for part 4. This form is intended as a suggested guide for teachers and/or students to evaluate visual presentations produced by students.

Student's Name _____ Title or Topic _____

VALUE	AREA OF EVALUATION
_____	1. APPROPRIATENESS If the student has had an opportunity to select either the topic or method of his presentation, is the choice of either or both appropriate to the assignment?
_____	2. ACCURACY Are the facts used in the presentation accurate? If not, where is the inaccuracy?
_____	3. COMPLETENESS Does the presentation represent a complete statement or coverage of the subject (Is there material or facts omitted which makes the presentation misleading)? If not, where is the presentation lacking?
_____	4. CLARITY Is the presentation clear to the viewer? _____a. Is the viewer readily able to determine the point or message contained in the presentation? _____b. Is the presentation free from unnecessary distractions? (pictures, drawings, etc. which do not contribute to the purpose? _____c. Are the colors and sizes of lines, bars, and/or pictures suitable? _____d. In the case of a collage or drawing, is the focal point clearly determined?
_____ (Total Score)	COMMENTS: _____

SELECTED RESOURCES

SELECTED RESOURCES

This compilation of resources material is by no means exhaustive. It is intended to "start" your search for those teaching aids which are most appropriate for your students and teaching style.

Many of these selections are mentioned throughout the Learning Activities while others are listed only as supplementary entries. Some cassette tapes and some films and filmstrips are intregal parts of specific Learning Activities. Suggested books, films, cassettes, bibliographies, catalogues, and pamphlets are noted for your convenience and consideration.

Contents

SELECTED RESOURCES

A. Books

Benarde, Melvin A., Our Precious Habitat. New York: W. W. Norton and Company, 1970.

Burke, John G., The New Technology and Human Values. Belmont, California: Wadsworth, 1966.

Callison, Charles H., America's Natural Resources. New York: The Ronald Press Company, 1957.

Carson, Rachel, Silent Spring. New York: Crest, 1969.

Darling, Lois and Louis, A Place in the Sun. New York: William Morrow and Company, 1968.

Evans, Robert and Humphrey, Clifford, What's Ecology. 1971.

Farb, Peter and Editors of Life-Time, Ecology. New York: Life-Time, 1970.

Halacy, D. S., The Water Crisis. New York: E. P. Dutton & Company, 1966.

Harner, Ruth M., Unfit for Human Consumption. Englewood Cliffs, N. J.: Prentice-Hall, 1971.

Hauser, Philip M., Editor, The American Assemble: The Population Dilemma. Englewood Cliffs, N. J.: Prentice-Hall, 1969.

Highsmith, Jr., Richard M. and Jenson, J. Granville, Rudd, Robert D., Conservation in the United States. Chicago: Rand McNally & Company, 1969.

Hyde, Margaret O., For Pollution Fighters Only. New York: McGraw-Hill Book Company.

Laycock, George, The Diligent Destroyers. Garden City: Doubleday & Company, Inc., 1970.

Leinwand, Gerald, Editor, Problems of American Society: Air and Water Pollution. New York: Washington Square Press, 1969.

Leopold, Aldo, A Sand County Almanac. Oxford University Press, 1970.

Love, Sam, Editor, Earth Tool Kit. New York: Pocket Books, 1971.

Marine, Gene, America the Raped. New York: Simon & Schuster, 1969.

Marx, Wesley, The Frail Ocean. New York: Coward-MaCann, Inc., 1967.

McCoy, J. J., Shadows Over the Land. New York: The Seabury Press, 1970.

Munzer, Martha E., Pockets of Hope. New York: Alfred A. Knopf, 1967.

Ogden, Samuel R., Editor, America the Vanishing. Brattleboro, Vermont: The Stephen Green Press, 1969.

Packard, Vance, The Waste Makers. New York: David McKay Company, Inc., 1960.

Paddock, William and Paul, Famine--1975! Boston: Little-Brown & Company, 1967.

Paradis, Adrian A., Reclaiming the Earth. New York: David McKay Company, Inc., 1971.

Raloff, Joan G. and Wyler, Robert C., There is No Away. Beverly Hills, California: Glencoe Press, 1971.

Rahrer, Daniel M., et al, The Environment Crisis. Skokie, Illinois: National Textbook Company, 1970.

Rockefeller, Nelson A., Our Environment Can be Saved. Garden City: Doubleday & Company, 1970.

Swatek, Paul, The User's Guide to the Protection of the Environment. New York: Ballentine Books, 1970.

Terry, Mark, Teaching for Survival. New York: Ballentine Books, 1971.

Udall, Stewart, 1976: Agenda for Tomorrow. New York: Harcourt, Brace & World, Inc., 1968.

Udall, Stewart, The Quiet Crisis. New York: Holt, Rinehart & Winston, 1963.

U. S. Department of Interior Yearbooks. Washington D. C.: U. S. Government Printing Office. May be secured for $2 each from: Supt. of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

Quest for Quality, 1965
The Population Challenge, 1966
The Third Wave, 1967
Man . . . An Endangered Species, 1968
It's Your World, 1969
River of Life, 1970
Our Living Land, 1971

With Man in Mind: An Interdisciplinary Prospectus for Environmental Design. Cambridge: MIT Press, 1970.

Wood, Dorothy and Frances, Animals in Danger. New York: Dodd, Mead & Company, 1968.

B. Cassette Tapes

The following tapes may be requested from the Center for Environmental Education, Monroe Center, 705 Avocado Avenue, Cocoa, Florida 32922. These tapes were prepared and manufactured by The Center for Cassette Studies, Inc., 8110 Webb Avenue, N. Hollywood, California 91605.

The American Wilderness	A conservationist discusses the influence of the wilderness on U. S. life. (27 min.)
Breathing Room	Dr. Robert Rienow details the alarming effects of air pollution. (27 min.)

The Ecological Spectrum	Barry Commoner discusses the interdependency of living creatures. (21 min.)
The Escape Hatch	What science can and cannot do to rehabilitate our environment. (28 min.)
I Can't Hear You, I've Got Pollution in My Ear!	Experts discuss noise pollution. (23 min.)
Our Vanishing Wildlife	A study of man's systematic destruction of vital life forms. (27 min.)

C. Films

1. Brevard County Films

The Automobile in America	(SND-51) Traces the growth of the automobile industry and its impact on the American way of life.
Automobiles--The Great Love Affair	54 min., J-C, (12-267-8). Examines the impact of the automobile on the economy, tastes and living patterns of Americans.
Challenge of the Oceans--Oceanography	27 min., J-S, (12-118). Examines the variety of currents, the life cycle in the ocean, topography and content of the sediments.
The Changing City	16 min., J-S, (8-236). Discusses the growth of the metropolis and its implications, such as the problems of land use and urban renewal.

Cities--A City is to Live In	54 min., J-S, (12-337-8). Investigates the smog problem. Studies the air pollution plans under consideration in Cleveland, Ohio.
The Everglades--Conserving a Balanced Community	11 min., 1-J, (8-662). Demonstrates that conservation must be included in plans for expanding human communities. Shows how water requirements of new residential areas in Florida are endangering species of wildlife in the Everglades National Park.
How Man Adapts to His Physical Environment	20 min., (12-405). Shows how various groups have adapted to the special physical conditions of the desert and how man's institutions and social practices have been determined by his environment.
Man in the Sea	28 min., (SND-30). Tells the story of the Sea Lab II experiment under the sea in 1965. Features underwater photography inside Sea Lab and in the sea around the vehicle.
Megalopolis: Cradle of the Future	22 min., S-C, (12-290). Examines the life and problems of Megalopolis, the urbanized northeastern seaboard extending from Boston to Washington, D. C. Shows metropolitan centers, transportation networks, harbors, suburban and rural areas.
Netherlands--The Struggle for Land	30 min., P-S, (12-298). Tells how the Dutch, through many centuries of continuous struggles, tamed their environment and made it serve them.
Nuclear Power in World Politics	20 min., J-C, (8-417). Provides a global view of the great problem facing our world--survival in the atomic age.

The Ocean--A First Film	11 min., E-J, (4-782). Explains that the ocean, which is the home of most of the world's life, influences all living things, including man.
Our Crowded Environment: The House of Man, Part II	11 min., E-J-S-C-A, (4-210). Presents the concept of population explosion Shows some of the problems that have resulted from the population explosion. Impresses the present generation with the severity of these problems.
The Silent Spring of Rachel Carson, Part I, II	54 min., J-S, (12-362-3). Discusses Rachel Carson's book, The Silent Spring. Explains how poisonous and biologically potent chemicals are used with little or no advance investigation of their effect on soil, water, wildlife and man.
What Are We Doing to Our World, Part I	27 min., J-S,)12-367). Points out ways of conserving our natural resources. Discusses air pollution, the population explosion, land usage, waste disposal and insecticides. From the Twentieth-First Century Series.
What Are We Doing to Our World, Part II	25 min., J-S, (12-368). Points out ways of conserving our natural resources. Defines ecology and studies the ecological problems of the Everglades, Aswan Dam and Panama Canal. From the Twentieth-Century Series.
What Is Ecology	11 min., S, (8-310). Introduces the story of ecology by illustrating the wide variety of interrelationships between plants, animals and their environment. Introduces the major biomes of the world. From the Biology Series, Unit 1, Ecology.

Automation: Promise or Threat	Filmstrip Kit (FSK-327). What has automation done in the United States? How are we to keep pace with the new technology?

2. Free Films

Eastman Kodak Company Audio-Visual Service 343 State Street Rochester, N. Y. 14650	We're On Our Way, 25 min., color.
Environmental Control Administration 12720 Twinbrook Parkway Rockville, Maryland 20852	Pandora's Easy Open Pop-Top Box, 15 min., color.
Film Library Chamber of Commerce P. O. Drawer 329 Jacksonville, Fla. 32201	A Quiet Revolution, 18 min. Film on urban renewal as experienced in Jacksonville, Fla., dealing with urban problems of raising taxes, health hazards, water and air pollution and traffic congestion.
Florida State University Media Center Tallahassee, Florida 32304	Bulldozed America, 25 min., b/w. The Green City, 23 min., color. Heritage of Splendor, 20 min., color. Florida Game and Freshwater Fish Commission, Sponsor.
Chief, Forest Education Branch Florida Division of Forestry Collins Building Tallahassee, Florida 32304	Adventures of Junior Raindrop, 7 min., color. Beyond the Suburbs, 30 min., color. Soil and Water Conservation, 10 min., b/w.

Song of Thy Works

A Strand Breaks

The Strands Grow (Ecology)

Time to Begin

What Is Ecology

Yours Is the Land, 20 min., color.

Modern Talking Picture Service
1212 Avenue of the Americas
New York, N. Y. 10036

Living With Today's Water, 26 min., color, J-S.
(Comes with mineral content testing kit.)

Public Health Service
50 Seventh Street
Atlanta, Georgia 30323

Tom Lehrer Sings Pollution, 3 min., b/w.

Shell Film Library
450 N. Merid Street
Indianapolis, Indiana 46204

Food or Famine, 29 min., color, J-S.

Rival World, 27 min., color.

The River Must Live

Unseen Enemies, 32 min., color.

3. Other Films

Conservation Foundation
1717 Massachusetts Ave., N. W.
Washington, D. C. 20036
Attention: Mrs. Nancy Hoover

A Matter of Time, 27 min., rental $10 for 7 days.
Gives historical background of environmental deterioration, assigned to provoke discussion.

Indiana University Audio-Visual Center
Field Services
Bloomington, Indiana 47401

In Search of Space, 40 min., color, rental $10. Probes the problems and possibilities of obtaining enough space for quality living.

Multiply and Subdue the Earth, 68 min., color, rental $18.50. Traces the religious-philosophical origins of western man's exploitative attitudes toward nature.

King Screen Productions
Education Division
320 Aurora Avenue, N.
Seattle, Washington 98109

Down Decibel Down, 10 1/2 min., color, sale $125. Effectively communicates the need for anti-noise legislation.

NBC Educational Enterprises, Inc.
30 Rockerfeller Plaza
New York, N. Y. 10020

No Turning Back, 10 min., b/w, rental $4.50. Tells that technological change has brought material well-being at a high cost in dehumanized lives and degraded environments.

Pollution Is a Matter of Choice, 53 min., color, rental $24.40. The price we have paid for modern living is a landscape of noise, dirt and tension.

The Ravaged Earth, 27 min., color, rental $14.40. Reveals the enormity of ecological and social costs resulting from a singular concern with the immediate economic profits.

Sterling Films Association
600 Grand Avenue
Ridgefield, N. J. 07657

1985. A simulated news broadcast in 1985 regarding ecological catastrophies around the world.

D. Miscellaneous (Bibliographies, Catalogues, Pamphlets)

Caterpiller Tractor Company 100 N. E. Adams Street Peoria, Illinois 61602	Booklets: "It's Time We Face America's Water Problem" "The Trouble With Trash"
Department of Natural Resources (Marine Patrol) Education and Information Film Library Larson Building Tallahassee, Florida 32304	
Environmental Protection Agency Washington, D. C. 20460	Periodical pamphlets "Environmental News"
W. H. Greeman & Company Market Street San Francisco, Calif. 94104	The Scientific American Offprints
Grade Teacher Magazine	January, 1969, p. 126, "Ecology: Books and AV Materials." (An introductory listing)
National Association of Conservation Districts Environmental Film Service Box 855 League City, Texas 77573	Free film catalog ($ to $5 handling fee per film).
National Science Teachers Association	"Environmental Education for Everyone," (36 pages of curriculum materials and bibliography).
Public Affairs Pamphlets New York, N. Y.	Public Affairs Pamphlet, No. 403, 1967, "The Battle for Clean Air," Edelson Edward.

Superintendent of Documents Government Printing Office Washington, D. C.	Air Pollution Film Catalog, Public Health Services Publication No. 1264.
Washington Education Association 910 Fifth Avenue Seattle , Washington 98104	Washington Education Magazine, May, 1970, pp. 22, 23. (Extensive bibliography of books, tapes, films.)
Water Pollution Control Federation 3900 Wisconsin Avenue Washington, D. C. 20016	Pamphlet "Nature Cleans Water, Man Can Too"